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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. LII 1957

1872

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JOHN F. HANSON

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JOSEPH C. BEQUAERT
GEORGE S. TULLOCH
JOHN F. HANSON

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Vol. LII FEBRUARY, 1957 No. 1

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BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES

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BULLETIN

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Vol. LII FEBRUARY, 1957 No. 1

DESCRIPTION OF THE IMMATURE STAGES OF DRUSINUS UNIFORMIS BETTEN (TRICHOPTERA: LIMNEPHILIDAE).[1]

By Oliver S. Flint, Jr., Ithaca, New York[2]

The genus *Drusinus* was erected by Dr. Betten in 1934 to receive the species *uniformis, sparsus,* and *virginicus.* The type series of *uniformis* was from Ithaca, and Hamburg, New York, it has since been recorded from Tennessee, Illinois, and New Hampshire. The immature stages of this genus have not been described previously.

Larvae now known to belong to this genus have been taken on a number of occasions, but it was not until the summer of 1956 that they were reared. The larvae and pupae on which this description is based were taken near Ithaca, New York.

LARVA: Length 15 mm., width 3 mm. Color cream, sclerites light brown to straw colored. Shape eruciform.

Head: Nearly uniform brown (fig. 1); many inconspicuous pale muscle insertion marks. Surface finely granulate. Mouthparts typical of family.

Thorax: Sclerites yellowish, clouded with brown; posterior margin of pronotum and mesonotum margined with black. Prosternal horn sclerotized, slightly over one-half length of fore coxae. Pleural sclerites yellowish, with many setae; pleural sutures margined with black. Legs straw colored, marked with black at articulations of pleurites and coxae, and femora and tibia.

Abdomen: First segment with spacing humps flattened; about 30 hairs between dorsal and lateral humps, and nearly 100 hairs on venter. Segments 2–7 dorsally with a pair of submedial setae

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[1] I wish to acknowledge the assistance of the Grace H. Griswold Fund for assuming the expense of engraving the plate.

[2] Department of Entomology and Limnology, Cornell University.

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on posterior half. Segment 8 dorsally with 12–15 setae along posterior margin. Mature larvae with oval sclerotized rings on venter of segments 2–7. Dorsal sclerite on segment 9 with about 20 setae; 3–6 setae laterally of sclerite. Sclerite around anal claw with 7–8 setae.

PUPA: Length 17 mm., width 3 mm. Color cream.

Head: Structure and setae as in fig. 5; group of 3 small bristles on postero-lateral part of vertex. Front with a dictinct rounded tubercle near center. Antennae extending to segment 6. Mouthparts typical of family.

Thorax: Pronotum with a pair of setae submedially. Mesonotum and metanotum with 2 pairs of submedial setae, one anteriorly, the other posteriorly. Coxae of fore legs with 5–8 setae on ventral surface; mid legs with 0–2 setae on coxae. Tarsi of mid and hind legs with hair fringe on basal 4 segments. Hind legs extending to segment 6.

Abdomen: First segment with 2 pairs of setae submedially. Dorsum of segments 2–7 with 3 pairs of setae sublaterally; segment 8 with 5 pairs of sublateral setae. Segments 2–8 with a pair of sublateral sclerotized bars both dorsally and ventrally. Tenth segment with 4 long black setae ventrally. Anal processes (fig 4) short and rounded; with 3 long pale setae apically, and 1 short dark seta internally.

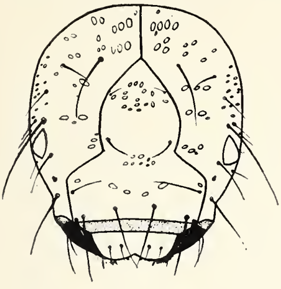
CASE: Length 15 mm., width 4 mm. Composed of small sand grains, very uniformly made, slightly tapered and curved. Pupal case generally cylindrical; closed in a very irregular manner with larger sand grains, contrasting markedly with the rest of the case.

The larvae will key to *Pycnopsyche* in Ross (1944). However, they differ quite markedly from *Pycnopsyche.* The most conspicuous character is the extreme hairiness, especially on the first abdominal segment in *Drusinus.* In addition *Pycnopsyche* generally has 3 or more gills along each lateral line, while *D. uniformis* rarely has more than one. The case of *Drusinus* is very different from any case described for *Pycnopsyche,* permitting easy separation in the field.

Explanation of Plate I

Fig. 1. Larval head, frontal. Fig. 2. Larval thorax, dorsal. Fig. 3. Larval legs, posterior: A, fore leg, B, middle leg, C, hind leg. Fig. 4. Pupal anal processes, dorsal. Fig. 5. Pupal head, lateral. Fig. 6. Pupal abdominal hook plates, dorsal: A, anterior, P, posterior. Fig. 7. Pupal gill diagram. Fig. 8. Larval gill diagram.

BULL. B. E. S. VOL. LII PLATE I



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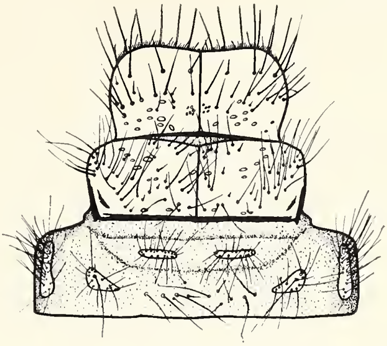

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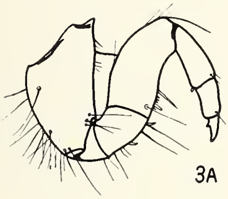

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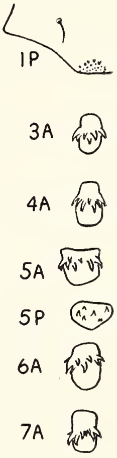
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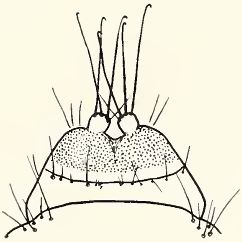
3A
4A
5A
5P
6A
7A

6



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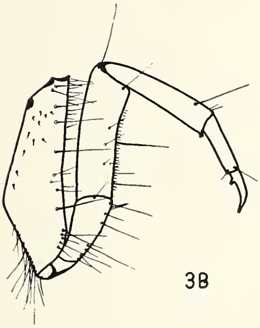

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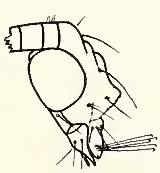

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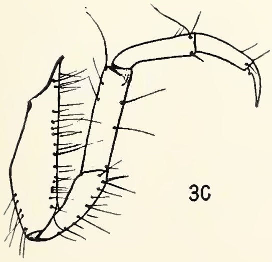

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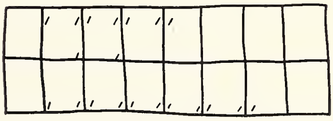

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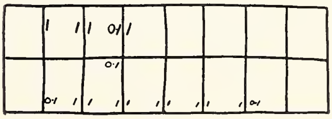

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The pupae will run to couplet 4 in Ross, but will not fit either alternative. The pupa differs from any described Nearctic limnephilid in the short rounded anal processes, and the frontal tubercle.

BIOLOGY: The larvae are restricted to small spring fed streams and pools. The Ithaca specimens were found in the overflow from a small spring. The larvae were extremely abundant under and around the small stones and moss in the stream. Larvae have also been found in a similar area in Newfield, New York, and in a spring pool in Slaterville Springs, New York. Ross (1944) records taking adults along a small spring-fed brook in Illinois. Specimens undoubtedly congeneric, but probably of another species, were taken in the spring-fed streams at the fish hatchery in Sunderland, Massachusetts.

Adults were taken from June 10 to July 14 at the spring. At night they are attracted by a gasoline lantern, and during the day are found resting in crevices in bark of trees around the spring. The first larvae were taken on August 8, indicating the egg stage may last about a month. The winter months are passed by the growing larvae, which complete development early in the spring. Prior to pupation the larvae burrow under rocks or gravel and attach the case loosely to the substrata.

Literature Cited

Betten, C. 1934. The caddis flies or Trichoptera of New York State. N. Y. State Mus. Bull. 292: 576 pp., 67 pls.

Ross, H. H. 1944. The caddis flies, or Trichoptera, of Illinois. Ill. Nat. Hist. Surv. Bull. 23 (1) : 326 pp., 961 figs.

NEW ENTOMOLOGICAL GROUP

At a meeting held in Raleigh, N. C. on November 17, 1956, the **North Carolina Entomological Society** was organized, with membership open to all interested in entomology.

Dr. C. F. Smith, Head, Dept. of Entomology, N. C. State College, Raleigh, was elected President, and Mr. James F. Green, of the N. C. State Dept. of Agriculture, Raleigh, Secretary-Treasurer.

THE GENUS EUCLIDIA, WITH THE DESCRIPTION OF A NEW SPECIES (LEPIDOPTERA, NOCTUIDAE, CATOCALINAE).

By JOHN G. FRANCLEMONT,[1] Ithaca, New York

Euclidia is a very compact genus of four species, *glyphica, dentata, ardita,* and *cuspidea;* the color patterns of which are essentially the same, the genitalia very simliar, and the two known larvae, *glyphica and cuspidea,* structurally very close, both having two pairs of well developed prolegs on the fifth and sixth abdominal segments and a vestigial pair on the fourth abdominal segment. The genus *Euclidina* proposed by McDunnough for the North American species *cuspidea* is not retained. The statement in the original description that ". . . the genitalia of this European species [*glyphica,* type of *Euclidia*] show little resemblance to those of our North American species, *cuspidea* Hbn., . . ." seems to be an overemphasis of the differences exhibited by the male genitalia of the two species. Although two groups of species can be defined, they can hardly be said to represent genera, and the differences are not sufficient enough to warrant subgenera. *Gonospileia* Hübner, [1823], (Verzeichniss bekannter Schmettlinge *sic!,* p. 281) used by Hampson (Catalogue of the Lepidoptera Phalaenae in the British Museum, vol. 13, p. 50, 1913) for this genus must be restricted to its type, *munitata* Hbn. (Fig. 1), and *triquetra* Fabricus [Schiffermüller, *nomen nudum*] (Fig. 19). The genitalia of these two species are quite different from those of the species referred to *Euclidia,* and the moths have a somewhat different appearance.

Pending the action on an appeal (Z.N.(S)684), received 4th June 1952) to the International Commission on Zoological Nomenclature to validate at least part of the names published in the "TENTAMEN," I am using the traditional name *Euclidia,* which was first proposed by Hübner in the "TENTAMEN," [1806], and subsequently used by Ochsenheimer in 1816 in the same sense as Hübner, and credited by Ochsenheimer to Hübner. Tams (Entomologist, vol. 72, p. 139, 1939) has suggested that *Euclidia* Hübner, 1808, replace *Schinia* Hübner, 1818, and that *Ectypa* Billberg, 1820, be used for the concept I am calling *Euclidia.*

The use of *Euclidia* is complicated by the provisions of Opinion 97 of the International Commission on Zoological Nomenclature and by the action of the Commission at Paris in 1948 (Bulletin of Zoological Nomenclature, vol. 4, 337–338, 1950); Opinion 97 declared the "TENTAMEN" not published in accordance with the provisions of Article 25 of the Règles, and the Commission's action at Paris reaffirmed this, but deleted the obviously erroneous statements in the Opinion. The next use of the name after the "TENTAMEN" was by Hübner in the "Erste Zuträge zur Sammlung exotischer Schmetterlinge", dated 1808; this work and the "TENTAMEN" are undeniably linked, the "generic names" of the "Erste Zuträge" are the "stirps names" of the "TENTAMEN". I placed an application (Z.N.(S)353) before the Commission in 1950 asking for the suppression of the "Erste Zuträge" for nomenclatorial purposes. If we grant that this work was published and distributed, for which there seems to be no contemporary evidence, only the first four generic names are available; the remaining names are *nomina nuda,* based upon then undescribed and unfigured species. However, it must be added that many of the specific names used in the "Erste Zuträge" were not original with Hübner, but had been proposed with an indication in the Megerle Sales Catalogue of September 1804. Sales catalogues are not considered acceptable publications for the availability of names, thus the status of the names used in the "Erste Zuträge" is not altered by their proposal in a previously published sales catalogue. I cannot see any way of gaining availability for the stillborn *nomina nuda* of 1808, except by descriptions or figures actually coupled with the names. It is absolutely necessary to republish the names in connection with at least indications. The plates of the "Zuträge", issued between [1808]–[1809] and [1809]–[1813] and used by Hemming to confer supposed availability upon the names, bear only numbers and no names, and thus any claim that they do confer availability is *ultra vires.*

---

[1] Department of Entomology, Cornell University, Ithaca, New York.

EUCLIDIA

Euclidia Hübner, [1806], Tentamen, p. [2]. (See: Opinion 97)
Type: *P* [*halaena*] *Noctua glyphica* Linnaeus, 1758 = *Euclidia glyphica* (Linnaeus). Monobasic.

Euclidia Hübner, 1808, Erste Zuträge zur Sammlung exotischer Schmetterlinge, pp. 3, 4, 8.

Included species: *Euclidia Gracilis* Hbn.
" *Graphica* Hbn.
" *Trifascia* Hbn.
" *Bifascia* Hbn.
" *Cuspidea* Hbn.

The only species described in the "Estre Zuträge" is *gracilis* [= *gracilenta* Hübner, 1818]; the remaining names are *nomina* *nuda.* Therefore if the name is consider as originating in this publication, it would be monobasic and would replace *Schinia* Hübner, 1818 (Zuträge zur Sammlung exotischer Schmettelinge *sic!,* vol. 1, pp. 8, 11, 14). However, doubt could be raised concerning the monobasic nature of the genus because *cuspidea* and *trifascia* were first proposed in the Megerle Catalogue of September 1804, where it was said of the former, to come from Georgia and to be near and larger than *glyphica,* and of the latter, to come from Georgia and to be near *ononis.*

Euclidia Ochsenheimer, 1816, Schmetterlinge von Europa, vol. 4, p. 96.

Included species: *Monogramma* Hbn.
Glyphica Linn.
Triquetra Schiff. (Fortificata Fabr.)
Mi Linn.

This is the traditional citation for the genus of those authors who ignore the works of Hübner.

Type: *P[halaena] Noctua glyphica* Linnaeus, 1758 = *Euclidia glyphica* (Linnaeus). Designated by Duponchel, 1829, *in* Godart, Histoire Naturelle des Lèpidoptères de France, vol. 7, part 2, 72.

Ectypa Billberg, 1820, Enumeratio insectorum in Museo Billberg, p. 86.

Included species: *Glyphica* Linn.
Glyphica var *Triquetra* Fabr.
Mi Linn.

Type: *P[halaena] Noctua glyphica* Linnaeus, 1758 = *Ectypa glyphica* (Linnaeus) Designated by Tams, 1939, Entomologist, vol. 72, p. 138.

Euclidina McDunnough, 1937, Canadian Entomologist, vol. 69, p. 66.

Type: *Drasteria cuspidea* Hübner, 1818 = *Euclidina cuspidea* (Hübner). Original designation and monobasic.

Euclidia cuspidea (Hübner), Figs. 12, 13, 14.

Noctua cuspidea Ziegler[1], 1804, *in* Megerle, Catalogus Insectorum quae Viennae Austriae die xx et sequentibus Septembris MDCCCIV auctionis distrabuntur, p. [16], no. 300. (Sales Catalogue, not available!)

Euclidia cuspidea Hübner, 1808, Erste Zuträge zur Sammlung exotischer Schmetterlinge, p. 8. (*Nomen nudum!*)

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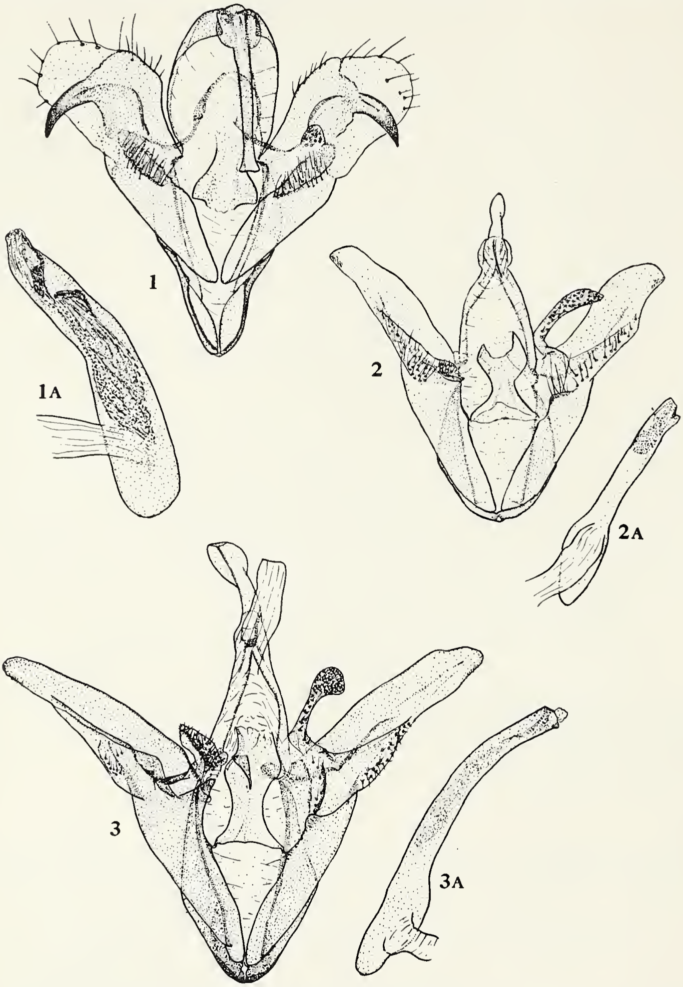
[1] I have not been able to identify the Ziegler credited with the authorship of the names in the Megerle Catalogues; without doubt the names should be credited to Megerle himself.

Drasteria cuspidea Hübner, 1818, Zuträge zur Sammlung exotischer Schmettelinge *sic!*, vol. 1, p. 16, pl. [12], figs. 69, 70.



Figs. 1–3 and 1A–3A. Male genitalia and aedoeagi of *Gonospileia munitata* (Hübner). "Europe" (1 & 1A), *Euclidia ardita* Franclemont. Malahat, British Columbia (2 & 2A), *E. cuspidea* (Hübner). Decatur, Illinois (3 & 3A). Figures 1 & 1A are twice the scale of figures 2 & 3 and 2A & 3A.

Euclidia cuspidea (Hübner), Holland, The Moth Book, 1903, p.

258, pl. 30, fig. 20.

Gonospileia cuspidea (Hübner), Hampson, 1913, Catalogue of the Lepidotera Phalaenae in the British Museum, vol. 13, p. 51 (in part).

Euclidina cuspidea (Hübner), McDunnough, 1937, Canadian Entomologist, vol. 69, p. 66.

Gonospileia cuspidea (Hübner), Draudt, 1940, *in* Seitz, Gross-schmetterlinger der Erde, vol. 7, p. 437, pl. 66, fig. e-1 (in part).

This species varies considerably in size (25mm to 38mm) and somewhat in the intensity of the color. In the south, where it is double brooded, it is largest; in the northwest it is smallest and somewhat darker in color. The range extends from Utah, Montana and Alberta to southern Quebec, thence south to northern Florida and southern Mississippi; it also occurs in the White Mountains of Arizona. The species is double brooded at least as far north as northern Virginia, but is single brooded at Ithaca, New York.

Male and female genitalia as figured; figures 3, 3A and 7.

Euclidia ardita n. sp., Fig. 15.

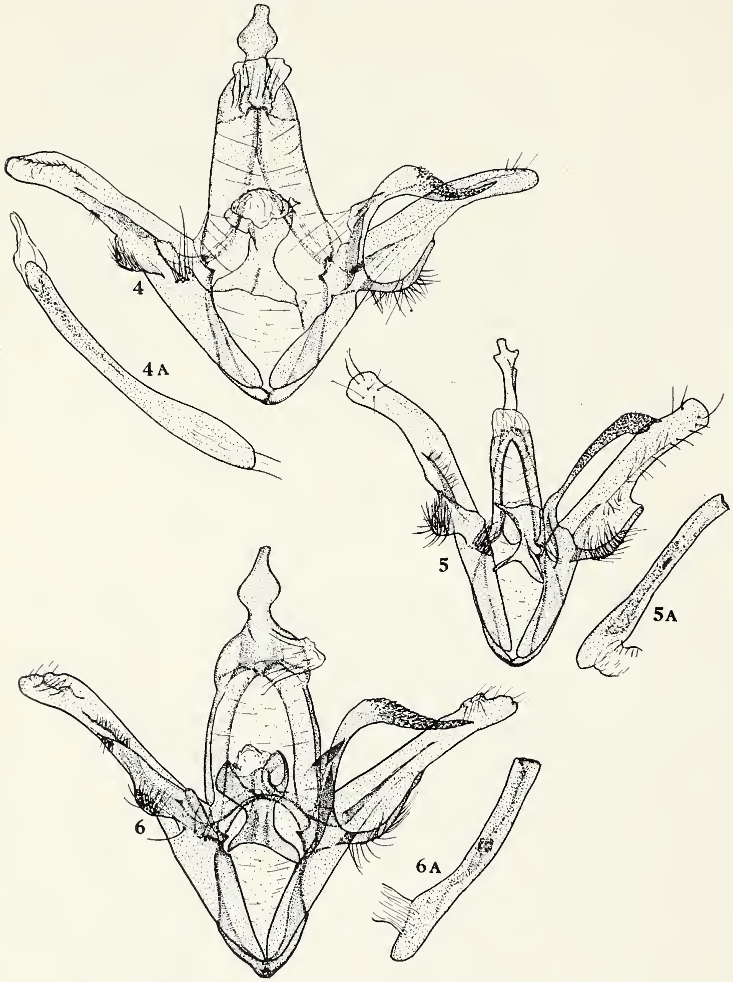
Euclidia cuspidea Butler (not Hübner), 1881, Papilio, vol. 1, p. 171.

Gonospileia cuspidea Hampson (not Hübner), 1913, Catalogue of the Lepidoptera in the British Museum, vol. 13, p. 51 (in part), pl. 223, fig. 3 (misidentification).

Gonospileia cuspidea Draudt (not Hübner), 1940, *in* Seitz, Gross-schmetterlinge der Erde, vol. 7, p. 437 (in part).

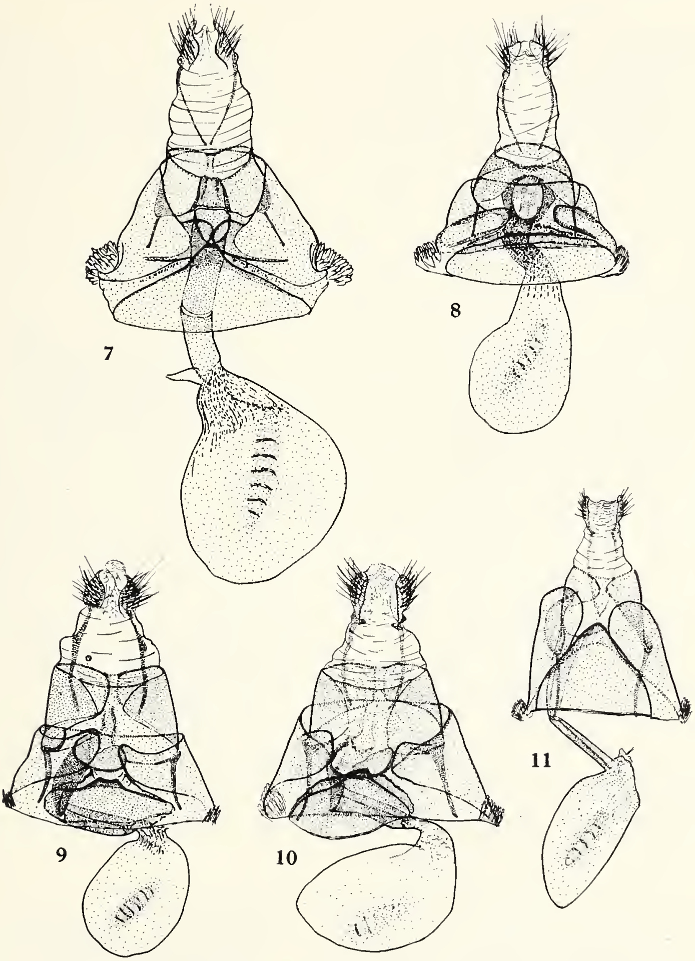
Superficially this species is very similar to *cuspidea* with which it has been confused in most collections. There is however, one difference which is rather constant: the outer margin of the shade lying on the outer side of the t.a. line in *cuspidea* is evenly curved in most specimens, whereas in *ardita* the middle part is almost straight or slightly incurved; also the general color of *ardita* is darker, with the hind wing showing brownish tints where *cuspidea* has yellowish or orange tints. The size is usually smaller than *cuspidea,* but specimens of the latter from western Ontario, Manitoba, Saskatchawan, and Alberta are as small or smaller than most specimens of *ardita.* The male and female genitalia of *cuspidea* and *ardita* show many discrete differences, for these reference may be made to the figures of these organs of both species.

General color brown with violaceous shadings. Fore wing dark violaceous brown; t. a. line sharply incurved to submedian fold, then sharply excurved to inner margin, forming a pronounced angle in the submedian fold; a dark brown oval spot near inner margin below angulation of t. a. line; a wide dark brown shade on outer



Figs. 4–6 and 4A–6A. Male genitalia and aedoeagi of *Euclidia dentata dentata* Staudinger. Yablonga, Manchuria (4 & 4A), *E. glyphica* (Linnaeus). "Norvegia" (5 & 5A), *E. dentata consors* Butler. Japan (6 & 6A). These figures are the same scale as figures 2 & 3 and 2A & 3A.

side of t. a. line, filling the angle in the submedian fold; t. p. line slightly excurved below costa to M_1, incurved from M_1 to submedian fold, then incurved from submedian fold to inner margin, forming an obtuse angle in the submedian fold; a dark brown triangle from outer side of reniform to t. p. line at M_1; a vague, wide, darkish brown shade on inner side of t. p. line below triangle to inner margin; subterminal area palest, but with a dark wedge-shaped mark on outer side of t. p. line below costa, and a small



Figs. 7–11. Female genitalia of *Euclidia cuspidea* (Hübner), Quincy, Illinois (7), *E. ardita* Franclemont. Los Angeles Co., California (8), *E. dentata dentata* Staudinger. Djalantun. Manchuria (9), *E. dentata consors* Butler. Japan (10), *E. glyphica* (Linnaeus). "Europe" (11).

outward pointing tooth below this in the interspace between R_5 and M_1; s. t. line vague, diffuse, pale and undulating; reniform large, ovoid; orbicular represented by a dark dot; median shade narrow, dark and undulating, from costa to inner side of reniform to inner margin. Hind wing brown; basal half dark blackish brown, outer half dull chestnut brown; two broad blackish brown bands crossing wing, one at outer margin of dark basal area, the second near middle of paler outer half. Expanse: males 25mm to 32mm, females 30mm to 34mm.

Hampson's figure cited above is a very good representation of this species.

The male genitalia (figures 2 and 2A) show a closer affinity with *cuspidea* than with the two Eurasian species. The uncus narrowly spatulate; valves asymmetrical, the right with a long, clubbed process, the left without a process but with a specialized hair patch on inner side near the base; juxta asymmetrical with the right side more massive; aedoeagus moderately long, vesica armed with a large patch of small spicules.

The female genitalia (figure 8) with seventh tergite with ventrally projecting, heavily sclerotized arms reaching the margins of the plate surrounding the ostium; seventh sternite a narrow oval plate with a strongly sclerotized ridge near its apex; ductus bursae short, well sclerotized, and with a narrow non-sclerotized band at about middle; the bursa membraneous, inwardly finely spiculate, and with a diffuse spindle-shaped signum with five or six more densely sclerotized transverse ridges.

Distribution: California, Oregon, Washington, northwestern Idaho, and British Columbia.

Type: Male, Mt. San Hedrin, Mendocino County, California, April 27, 1939. W. R. Bauer, in Franclemont Collection.

Paratypes: 36 Males, 45 Females; from California (68), Oregon (1), Washington (1), Idaho (1), and British Columbia (9); in the

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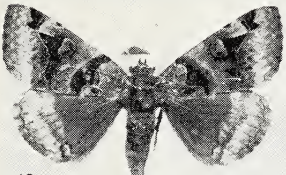
EXPLANATION OF PLATE II

Figs. 12–19. Adult specimens, natural size of *Euclidia cuspidea* (Hübner). Male; Arlington, Virginia (12); *E. cuspidea.* Male; Ithaca, New York (13); *E. cuspidea.* Female; Lloydminster, Alberta (14); *E. ardita* Franclemont. Male; Robson, British Columbia (15); *E. dentata dentata* Staudinger. Male; Yablonga, Manchuria (16); *E. dentata consors* Butler. Male; Yatsugatake, Japan (17); *E. glyphica* (Linnaeus). Male; Chislehurst, Kent, England (18); *Gonospileia triquetra* Fabricius. Male; Hungary (19).

Bull. B. E. S. Vol. LII

Plate II



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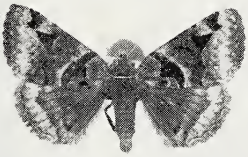

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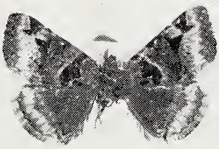

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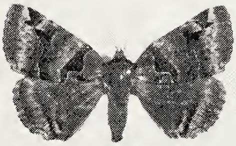

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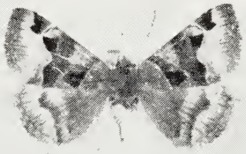

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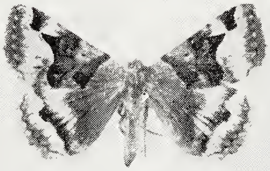

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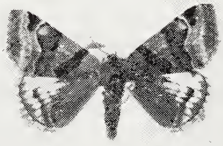

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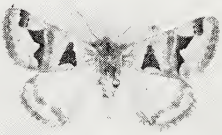

19

United States National Museum Collection (36), the American Museum of Natural History Collection (19), the Cornell University Collection (5), the William R. Bauer Collection (12), and the Franclemont Collection (9).

Euclidia dentata Staudinger, Fig. 16.

Euclidia cuspidea Eversmann (not Hübner), 1857, Bulletin de la Sociétè Impériale des Naturlistes de Moscou, 1857, part 4, p. 436 (misidentification). Atlai Mountains.

Euclidia cuspidea Lederer (not Hübner), 1857, Die Noctuinen Europas, p. 195 (misidentification). Atlai Mountains.

Euclidia glyphica var. *dentata* Staudinger, 1871, Catalog der Lepidopteren des Europaeischen Faunengebiets, Ed. 2, p. 135. (New name for *cuspidea* Eversmann, 1857, and *cuspidea* Lederer, 1857, not Hübner, 1818.)

Euclidia glyphica var. *dentata* Staudinger, Staudinger, 1892, Memoirs sur les Lépidoptères, Rédigès par N.M. Romanoff, vol. 6, p. 573 (in part).

Gonospileia dentata (Staudinger), Hampson, 1913, Catalogue of the Lepidoptera Phalaenae in the British Museum, vol. 13, p. 52 (in part).

Gonospileia dentata (Staudinger), Warren, 1913, *in* Seitz, Macrolepidoptera of the World, vol. 3, p. 344 (in part), pl. 62, fig. k-l.

This species was initially confused with the North American *cuspidea;* it is known from the Atlai Mountains and from Manchuria. The material before me was collected in the last locality. The species can be distinguished very easily from *cuspidea* by the t. a. line, which is more or less evenly curved from costa to inner margin, and by the absence of the dark brown oval spot near the inner margin in the basal area; otherwise the appearance is very similar.

Male genitalia figures 4 and 4A, female genitalia figure 9.

Euclidia dentata consors Butler, Fig. 17.

Euclidia consors Butler, 1878, Annals and Magazine of Natural History (series 5), vol. 1, p. 293.

Euclidia consors Butler, Butler, 1878, Illustrations of Typical Specimens of Lepidoptera Heterocera in the Collection of the British Museum, part 2, p. 42, pl. 34, fig. 6.

Euclidia glyphica var. *dentata* Staudinger, Staudinger, 1892, Memoirs sur les Lépidoptères, Rédigés par N. M. Romanoff. vol. 6, p. 574 (in part).

Gonospileia dentata (Staudinger), Hampson, 1913, Catalogue of the Lepidoptera Phalaenae in the British Museum, vol. 13, p. 52 (in part).

Gonospileia dentata (Staudinger), Warren, 1913, *in* Seitz, Macrolepidoptera of the World, vol. 3, p. 334 (in part), pl. 62, fig. k-2.

Superficially specimens of *dentata* from the islands of Japan show a tendency to be larger and somewhat more crisply marked, and the male and female genitalia show differences which are constant in the short series of specimens available for study. It thus seems advisable to treat the Japanese populations as a distinct race from the mainland Asiatic populations. Butler's name *consors,* based on specimens from Japan, is available.

Male genitalia figures 6 and 6A, female genitalia figure 10.

Euclidia glyphica (Linnaeus), Fig. 18.

P[*halaena*] *Noctua glyphica* Linnaeus, 1758, Systema Naturae, Ed. 10, p. 510.

Euclidia glyphica ab. *tristicula* Schultz, 1908, Societas Entomologica, vol. 22, p. 186.

Euclidia glyphica ab. *suffusa* Spuler, 1908, Die Schmetterlinge Europas, vol. 1, p. 307.

Euclidia glyphica ab. *marginata* Spuler, 1908, Die Schmetterlinge Europas, vol. 1, p. 307.

Euclidia glyphica ab. *obsoleta* Spuler,[2] 1908, Die Schmetterlinge Europas, vol. 1, p. 307.

Euclidia glyphica form *taurica* Culot, [1916?], Noctuelles et Géomètres d'Europe, vol. 2, p. 181, pl. 72, fig. 16.

Euclidia glyphica var. nova *aurantiaca* Schawerda, 1928, Zeitschrift Oesterrichischer Entomologen-Verein, vol. 13, p. 105.

The forms of this well known species are illustrated in Seitz, Macrolepidoptera of the World, vol. 3, pl. 62, and almost every general work on the European Lepidoptera mentions or figures the species. The range is given by various workers as covering most of Europe, Asia Minor, and Siberia. I have seen material from only Western Europe.

Male genitalia figures 5 and 5A, female genitalia figure 11.

Grateful acknowledgement is made to the Grace H. Griswold Fund of the Department of Entomology of Cornell University for assuming the expense of engraving the plates.

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[2] This name is credited to Strand by Spuler, but I have been unable to find any reference to where Strand may have published the name.

NEW SPECIES OF PENTATOMIDAE FROM NORTH AND SOUTH AMERICA (HETEROPTERA) I.

By Herbert Ruckes,[1] New York, N. Y.

Through various agencies the following pentatomids have become available for study. It is deemed advisable, at this time, to publish descriptions of these new species so that our knowledge of the various genera involved may be enhanced. In most cases, unfortunately, only two or three specimens of each species are as yet available but, from all indications, the differences between these and previously known relatives are sufficiently distinct to warrant erecting new names for them.

The various ratios given in the descriptions are dimensions measured through a binocular microscope, using a ×2 objective and a ×9 ocular fitted with a micrometer scale divided into one hundred linear units; they are not in terms of millimeters except as mentioned in connection with the holotypes and allotypes.

Tribe Discocephalini

Platycarenus (Discocephalessa) tenebricornis n. sp.

Oval, very similar in size and shape to *P. clypeatus* (Stal) but over-all much darker due to the coarser and more numerous fuscous and ferruginous punctures, particularly on the venter and the legs. The following differences will readily separate the two species. Antennal segment I dull yellow with a few fuscous marks, the remaining segments uniformly fuscous to piceous, not fusco-lineate as in *clypeatus* or fusco-punctate as in *humilis* (Herrich-Schaeffer). Humeral angles roundly obtuse and not weakly emarginate as in *clypeatus.* The frenum ends at a point somewhat beyond the middle of the scutellum and not at the middle as in *clypeatus.* Abdominal venter with more and coarser punctures than in allied species with many of the punctures enroaching on the middle of the abdominal disc; this area is impunctate in *clypeatus.* Fuscous spotting on the legs, particularly on the tibiae, very conspicuous, with the spots on the latter tending to become confluent so as to form dark, broken bands along the margins of the tibial sulci.

From the posterior aspect the ectal margins of the male parameres are distinctly sinuate rather than vertically straight as in *clypeatus;*

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[1] Research Associate, Department of Insects and Spiders, the American Museum of Natural History, and Professor Emeritus, the City College of New York.

the dorsal tips of the parameres reach above the dorsal margin of the genital segment and diverge there so that the two parameres combined give the impression of being lyriform; in *clypeatus* the tips of the parameres barely reach the dorsal margin of the segment and the two taken together form a rectangular outline.

The other characteristics are as in *clypeatus.*

This could possibly be a subspecies of *clypeatus* and limited to the southwestern region of the United States but the differences in the male genitalia and the darkness of color and coarser punctuation suggest that this form is a distinct species. It is found feeding at the bases of the leaves of *Agave.* I have taken them from the axils of such leaves.

Described from 16 males and 15 females as follows:

Holotype: Male: 8 mm. long; 4.5 mm. wide across humeri. Madera Canyon, Santa Rita Mountains, Pima County, Arizona. August 13, 1952. C. and P. Vaurie, collectors. Deposited in the American Museum of Natural History.

Allotype: Female: 9.0 mm. long; 5 mm. wide across humeri. Same data as above.

Paratypes: Arizona, Pima County, Madera Canyon, Santa Rita Mountains: August 13, 1952, C. and P. Vaurie collectors (8 males, 5 females); July 14, 1952, G. M. Bradt collector (1 male, 1 female); July 1, 1932, E. D. Ball collector (5 males). Cochise County, Huachuca Mountains, Ramsey Canyon, July 5, 1941, H. Ruckes collector (1 male, 5 females); July 19, 1935, E. D. Ball collector (2 females); Huachuca Mountains, Petersen's Ranch, August 17, 1940, E. C. Van Dyke collector (1 female).

Two male and two female paratypes are being deposited in the California Academy of Sciences. The remainder are in the American Museum of Natural History.

I have used the name *tenebricornis* for this new species to emphasize the presense of uniformly fuscous to piceous antennae. Stal in his original description of his species *clypeatus* stated that in that form the antennae are more or less uniformly pale with fuscous lineations on the basal segments. Dallas in erecting the species *marginellus* called attention to the presence of an impunctate margin to the lateral border of the pronotum and the bases of the elytra. The species *tenebricornis* shows no evidence of such impunctate areas. It is thus distinct from the two but still closely related to both.

Platycarenus (Discocephalessa) pseudopolitus n. sp.

Superficially like *P. politus* (Signoret) in color and size but not as glossy and with distinctly different puncturation. In *politus* the reddish, ferruginous and fuscous punctures are quite uniform in size and very equally spaced on both the dorsum and venter, whereas in *pseudopolitus* the similarly colored punctures are of varying sizes and are very irregularly disposed on the dorsum and venter.

Head less than two and a half times as wide through the eyes as long medianly (65 × 30), the margins before the eyes very weakly sinuate (in *politus* the head is more than two and a half times as wide as long, i. e. 80 × 30, and the margins before the eyes not at all sinuate); the surface vaguely undulant with weak depressions at the bases of the juga adjacent to the eyes; punctures irregularly distributed, leaving slightly raised laevigated lines between them; a clearly defined impunctate area between each ocellus and the eye. Antennal segmental ratios 10/17/22/25/25, i.e. segment V not twice as long as segment II; segments I, II and III dull yellow, thickly conspersed with fuscous punctures, segments IV and V dark fuscous broadly annulated with dull yellow at their bases; in *politus* the antennal segments measure 10/10/17/22/27, i.e. segment V more than twice as long as segment II and the segments are more or less concolorous dark yellow with only a vague sprinkling of reddish punctures on segments I, II and III.

Pronotum about two and one-third as wide across the humeri as long medianly (112 × 48), slightly longer proportionately than in *politus* in which the ratios are 100 × 45, or about two and one-fifth times as wide as long; the punctures irregularly scattered and reaching the anterior margin, which in *politus* is present as a yoke-shaped ivory colored, impunctate band; posterior median portion of the disc vaguely transverse rugose lateral to which area there is an oblique band of condensed fuscous punctures on each side; humeral area slightly tumid.

Scutellum in the same proportions as in *politus* but with the punctures irregularly distributed and reaching the apex, which is concolorous; in *politus* the apex is ivory colored, impunctate and preceded by a broad transverse fuscous band; a subbasal fuscous patch present on the disc but much smaller than in *politus;* basal angles piceous with some congested punctures; in *politus* the basal angles are concolorous with the disc and the punctures well separated. Elytra with punctures disposed in clusters on the corium, leaving a number of irregular laevigate areas there, less irregularly spaced on the clavus and embolium. Connexivum well exposed, finely and uniformly ferruginous punctate, the basal and apical angles of the segments broadly piceous, but the incisures not banded.

Venter dark yellow, almost orange in color, punctures red to fuscous; coarse fuscous ones arranged in two broad longitudinal, parallel bands on each side of the thorax and then extending onto the abdomen where the bands become somewhat confluent; some scattered red punctures on the thorax; between the bands and the abdomnial margin the punctures are red and uniformly exceedingly fine; between the bands and the inner portion of the abdominal disc the punctures are red, of various sizes and irregularly distributed, leaving a vague median impunctate line; the abdominal segmental angles are conspicuously black.

The lateral edge of the basal plates of the female genital valves distinctly concave, terminating apically in a minute, laterally projecting, triangular denticle. The most striking feature of this new species is found in the impressed and deeply invaginated ventral surface of the last abdominal segment, producing a pair of conical, tunnel-like spaces above and to the sides of the genital valves.

Unfortunately no male is known at the present writing. Described from three female specimens.

Holotype: Female: 9.0 mm. long; 5.75 mm. across humeri. Horqueta, Paraguay, December 29, 1938. Deposited in the American Museum of Natural History.

Paratypes: Two females. Same data as above.

Tribe Halyini

Brochymena laevigata n. sp.

Form oval but not as broadly so as in *Brochymena carolinensis* (Westwood); color dark cinerous and glossy due to the laevigate areas on most of the body; dorsal surface definitely depressed.

Head about as long as wide through the eyes (68 × 65), the lateral margins gradually converging to a subacute apex; juga only very slightly longer than the tylus with a minute apical sinus present; subapical teeth blunt, not at all produced and leaving no sinus between their bases and the margins of the head; entire margin before the eyes laevigate ivory; a medium laevigate line extending from the apex of the tylus across the pronotum and reaching the apical third of the scutellum. Antennae dark fuscous to piceous with only the joints between segments II and III pale; segmental ratios: 18/30/40/40/40, i.e. segment III only one-third longer than segment II (in *carolinensis* the ratios are 18/30/50/45/40, i. e. segment III at least half again as long as segment II).

Pronotum about two and a third times as wide across the humeri as long medianly (165 × 70), irregularly punctured and pitted; surface strongly undulant with the unpunctured areas ivory laevigate, especially behind the cicatrices and adjacent to the basal angles of the scutellum; humeri prominent with the dorsal surface of each in the form of a high crest; a deep antehumeral sinus present as in *carolinensis* but the anterolateral margins more strongly arcuate than in that species, impunctate, smooth and contrastingly ivory colored; the marginal denticles in the form of flat triangular serrations rather than terete pegs.

Scutellum one-third longer than wide across the base (120 × 90), irregularly and somewhat sparsely pitted and punctured, much of the surface laevigate ivory; basal angles deeply excavated obliquely, a cluster of large pits just mesad of each angle and a few scattered pits across the base transversely; middle of disc impressed each side of a broad obtuse longitudinal ridge; most of the punctures localized centrally. Hemelytra finely, densely and very evenly punctured, much in contrast with the coarsely and irregularly eroded scutellum; the hemelytra not impressed into the abdominal dorsum as in *carolinensis.* Connexivum widely exposed and alternated reddish fuscous and sordid yellow; the entire abdominal margins above and below smooth and ivory colored.

Abdominal venter dark yellow or brown, finely and densely punctured with fuscous and piceous laterally and irregularly and more sparsely punctured lighter medianly; the lateral piceous lunate markings on each segment, common in many species, here are lacking, the abdominal margins narrowly laevigate ivory. Legs dark fuscous, almost piceous with a contrasting, broad, ivory annulus, containing an elongated central maculation, on each tibia and an incomplete subapical annulus on each femur.

Male genital segment much like that in *carolinensis* but with the lateral angles less widely spread and not as produced but with the submarginal impressed area more pronounced; head of the paramere (clasper) shorter, the exposed flat surface broadly oval rather than elliptical as in *carolinensis.* Female genital similar in both species.

Described from two specimens as follows:

Holotype: Male: 15 mm. long; 8 mm. wide through the humeri. Reelfoot Lake, Tennessee. October 15, 1952. Deposited in the American Museum of Natural History.

Allotype: Female: 17 mm. long; 9 mm. wide across the humeri. Reelfoot Lake, Tennessee. October 15, 1952. Deposited in the American Museum of Natural History.

Very patently related to the *carolinensis* complex of the genus *Brochymena* but slightly smaller in size than its near relatives. The principal distinctive characteristics are found in the extensive distribution of laevigate areas on the body, the strikingly ivory colored, arcuate, anterolateral margin of the pronotum and the contrast in puncturation between the hemelytra and scutellum. While there is considerable similarity in the form of the male genitalia, there is sufficient difference in proportions of the parts to permit ready separation of this species from others.

Brochymena splendida n. sp.

Broadly oval; a large form almost the size of *B. myops* Stal and apparently related to that species; colors in striking contrast, black, fuscous, orange, ivory and occasionally red. Body above not as depressed and faceted as in *carolinensis* but more so than in *myops*.

Head about as long medianly as wide through the eyes (72 × 75), its anterior margins reddish or orange brown; subapical teeth inconspicuous, their sinuses obtuse, almost obsolescent; apex short and broadly triangular and subtruncate at the tip; juga slightly longer than the tylus, leaving a small rectangular sinus apically; apical fourth of the tylus orange brown or reddish; punctures on disc coarse, somewhat coalescent, leaving numerous irregular, reddish or orange brown laevigate areas between the punctures.

Pronotum slightly more than twice as wide through the humeri as long medianly (190 × 90); humeri not at all prominent; anterolateral margins essentially straight (strongly arcuate in *myops*) and reaching the humeri without a deep antehumeral sinus being formed; margins calloused orange brown or red (one specimen is carmine) with five or six short triangular teeth; crests of humeri not at all prominent and tinged reddish or sordid orange; disc coarsely and sparsely punctured and pitted with many irregular orange, reddish and ivory laevigate areas showing.

Scutellum only one-fifth longer than wide at the base (140 × 115); basal angles without a large calloused ivory spot as in *myops* but coarsely pitted and with a band of piceous punctures and pits extending obliquely across the base near the angles. Elytra with numerous smooth, irregular, substellate, dull ivory or light orange points between the fuscous punctures, with some concentration of the laevigate areas at the bases. Connexivum rather widely exposed, the segmental incisures broadly banded with black on each side, the areas between the bands reddish or orange and nearly impunctate.

Abdominal venter dull yellow or orange with ferruginous punctures concentrated laterally, no sharply defined fuscous lunate bands near the margins of the segments as in many other species, only the basal and apical angles piceous; spiracles bordered with a piceous ring which is confluent with a piceous or fuscous spot anteriorly and narrowly separated from a piceous or fuscous spot posteriorly; metapleural plate adjacent to the evaporating area coarsely and sparsely punctured black; propleuron with a submarginal band of black just beneath the pronotal denticles; mesosternum with a pair of large black spots between the pro- and mesocoxae.

Femora sordid yellow heavily conspersed with black, a subapical, incomplete pale annulus present, the distal ends of the femora bright red or orange; tibiae with three equally large color bands, the basal one black, the intermediate one immaculate ivory (i.e. without a black spot at its center, thus much like that found in *myops*) and the fuscous distal one becoming red or orange apically. Rostrum fuscous for the most part (only the apex of segment I and the base of II being paler) and reaching the base of the fourth abdominal segment. Antennal ratios: 18/30/35/43/45, i.e. segment II slightly shorter than segment III, segments IV and V longest and subequal; basal segment red or orange, the remaining ones uniformly piceous.

Inner apical angles of the female genital plates broadly piceous or fuscous.

Described from three female specimens as follows:

Holotype: Female: 19.0 mm. long; 9.5 mm. wide across humeri. Seven miles south of Tumbiscatio, Michoacan, Mexico. December 1, 1950. Collector Ray F. Smith. Deposited in the American Museum of Natural History.

Paratypes: Female: One with the same data as above.

Female: One, Mexico, Morelos, 10 miles east of Cuernevaca. December 9, 1948. Collector E. D. Ross. Deposited in the California Academy of Sciences, San Francisco, California.

As already mentioned, there is apparently close relationship between this species from Mexico and the more northern and eastern *myops* and *carolinensis*. There is considerable difference in the shape of the head, however, and the color pattern is much more striking. The absence of a black maculation on the broad pale annulus of the tibia is a condition found only in *myops* and *splendida,* but the very straight anterolateral margin of the pronotum and absence of an ante-humeral sinus, present in both *myops* and *carolinensis,* immediately sets this species off from the others.

Brochymena chelonoides n. sp.

Closely related to *Brochymena parva* Ruckes but larger, more robust, more convex dorsally, of a lighter hue and more glossy. Overall color ranging from light brown to cinerous brown, being made of a sordid yellow background and punctured with fuscous, and in freshly captured specimens provided with a whitish bloom in the fuscous punctures; in *parva* the darker color is due to a greater congestion of somewhat larger, more numerous fuscous to piceous punctures on a brown background.

Head as wide through the eyes as long medianly (60 × 60), the laevigate yellowish longitudinal lines usually not as distinct as in *parva;* subapical teeth rectangular to obtuse and their associated sinuses likewise rectangular to obtuse rather than both being acute as in *parva;* juga usually slightly longer than the tylus, forming a minute rectangular sinus apically; antennae fuscous to piceous, the segmental ratios being 12/25/35/35/30, i.e. segment II distinctly shorter than segment III; in *parva* the ratios are 12/25/30/–30/25, i.e. segment II only slightly shorter than segment III and all segments thinner than in the new species.

Pronotum quite convex in both lateral and longitudinal diameters, about two and one-third times as wide across the humeri as long medianly (150 × 65); anterolateral margins with more and slightly larger acicular teeth than in *parva* and the discal areas above and below the margin less tumid than in that species; humerous acutely angled and provided with a few serrations on the anterior border as in most species of the genus; a moderate ante-humeral sinus present; punctures and pits on the pronotal disc more shallow, not as large or as numerous or as in *parva* and with more laevigate interpunctural areas visible.

Scutellum about one-fifth longer than wide across the base (115 × 95), punctures rather uniform in size and evenly distributed except those at the apical third which are smaller and more wide-spaced; larger pits confined almost exclusively to the basal area; some coalescing punctures frequently forming a darker transverse broad band across the shield adjacent to the area where the frenum ends. Hemelytra more finely and densely punctate with some small laevigate points irregularly scattered, one larger laevigate spot toward the base of the corium and embolium. Vermiculate markings on the membrane as conspicuous as in *parva.*

Connexivum well exposed and for the most part sloping downward to continue the even transverse convex curvature of the dorsal surface; strikingly alternated, the incisures being broadly banded on each side with fuscous; the apical segmental angles rectilinear rather than subacute as in *parva* and not as distinctly produced as there, especially on the first three segments.

Venter sordid orange-brown, darkening laterally; the abdominal segments provided with submarginal lunate fuscous to piceous bands similar to those found in many allied species; legs annulated, each tibial pale annulus provided with a central dark spot; rostrum reaching at least the apical margin of the second abdominal segment, usually farther.

Male genital segment more widely spread than in *parva* and the apical angles more produced and more acute; parameres proportionately larger and the dorsal tips of them distinctly acute. Female genital plates similar to those found in allied species.

Described from thirty-eight specimens as follows:

Holotype: Male: 13.5 mm. long; 7.0 mm. wide across the humeri. Del Rio, Texas. July 9, 1931. William T. Davis, collector. Deposited in the American Museum of Natural History.

Allotype: Female: 15.5 mm. long; 8.0 mm. wide across the humeri. San Antonio, Texas. July 10, 1931. William T. Davis, collector. Deposited in the American Museum of Natural History.

Paratypes: Twenty-seven females and nine males as follows: Texas: Brownsville, July 23-August 1, 1906 (2 males, 7 females); Laredo, July 11, 1930 (1 male, 1 female); Marathon, June 10, 1930 (1 male, 2 females); Kingsville, no date (2 males, 8 females in the Cornell University collection); College Station, December 1, 1936 (2 males); Castolon, May 29, 1928 (1 female); Carrizo Springs, June 23, 1928 (1 female); Port Isabel, July 22, 1906 (1 female); Edinburgh, April, 1939 (3 females in the University of Michigan collection). Mexico: Coahuila, Musquiz, June 30, 1938 (1 male, 3 females).

Unless otherwise specified, the above paratypes are deposited in the American Museum of Natural History.

The convexity of this species has suggested the name *chelonoides* referring to the turtle-like form of the dorsal aspect. As already stated, there is much in common between this species and *B. parva*. However, the less tumidity of the pronotum above and below the anterolateral margins, the larger size, more robust antennae, lighter color in general, the more convex form of the body, the less numerous punctures and pits on all dorsal portions of the thorax and scutellum, the more widely spread apical diameter of the male genital segment and the more acutely tipped parameres, as well as the slightly larger and more numerous anterolateral marginal denticles, set this species off from its close relatives. From the present record this species seems to be confined to the central and southwestern area of Texas and northeastern region of Mexico.

THE IDENTITY OF PEDICULUS SPICULIFER GERVAIS (ANOPLURA).

By Phyllis T. Johnson,[1] Washington, D. C.

Pediculus spiculifer Gervais, 1844, has remained an unplaced name in the Anoplura, for no collections have been made from its type host or near its type locality since the original description. Through the kindness of Dr. Theresa Clay, of the British Museum of Natural History, I have had the opportunity to study a small collection of Moroccan Anoplura sent her by Dr. J. Bruneau, Institut Pasteur du Maroc, Casablanca. Included were five females and three males of a species of *Hoplopleura* from *Lemniscomys barbarus* taken in Tit Mellil, a suburb of Casablanca. *Lemniscomys barbarus* is the type host of *Pediculus spiculifer,* and the Moroccan locality is not far from its type locality of "Algeria." Dr. G. F. Ferris had discussed the possibility that *spiculifer* might be a species of either *Polyplax* or *Hoplopleura* (1935, 1951) and earlier (1921) had conjectured that some Sudanese specimens from *Lemniscomys barbarus zebra* he determined as close to *Hoplopleura enormis* Kellogg and Ferris might represent *spiculifer.* Consideration of the proximity to the type locality and their occurrence on the type host and a re-evaluation of the original description of *spiculifer* allow the Moroccan specimens to be identified as *spiculifer* Gervais.

I am grateful to Dr. Clay for lending the specimens of *spiculifer* Gervais and donating a pair to the U. S. National Museum collections and to Dr. Ferris for valuable advice concerning the status of these *Lemniscomys* lice.

Hoplopleura spiculifer (Gervais, 1844) **new comb.**

Pediculus spiculifer Gervais, 1844, in Baron Walckenaer's Histoire Naturelle des Insectes. Aptères. III: 302. - - - Ferris, 1921, Stanford Univ. Publ. Biol. Sci., II(2): 95. - - - Ferris, 1935, *Ibid.*, II(8): 617. - - - Ferris, 1951, Mem. Pacific Coast Ent. Soc., 1: 283.

A translation of salient points in the original description is as follows: "Abdominal segments serratiform with a short spiniform seta on either side of each segment; . . . basal segment of antennae swollen, the second more slender, cylindrical, equal to the third and fourth together which are moniliform; the fifth of the same size as the third. Found on a *Mus barbarus* [now known as *Lemniscomys barbarus*] from Algeria sent living by M. de Blainville through M.

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[1] Entomological Research Branch, Agricultural Research Service, U.S.D.A.

le D. Guyon."

Gervais' description of *spiculifer* antennae fits *Hoplopleura* much better than *Polyplax* and, further, lobed paratergal plates as found in the *H. enormis* group of *Hoplopleura* give the abdominal segments a "serratiform" appearance. The statement that either side of each abdominal segment bears a short spiniform seta is puzzling unless Gervais was referring to the lateral-most processes of the paratergal plates which might be mistaken for spiniform setae, if viewed uncritically.

Diagnosis.—A member of the *enormis* group; close to *enormis* Kellogg and Ferris, 1915, in that the paratergal plate of the sixth abdominal segment bears three apical processes, the seventh one (in male *enormis* and *spiculifer* this process obsolescent), and the eighth none. Head shape, chaetotaxy of the abdomen, and shape of the thoracic sternal plate are essentially the same as in *enormis* (figs. 1, 2). Female is separable from *enormis* in that the dorsal-most process of paratergal plates 3–7 is only as long as the plate which bears it (fig. 4, *spiculifer*) not almost twice as long (*enormis*). In the male the dorsal-most process is much shorter than the corresponding paratergal plate, and is of the same length or shorter than the subdorsal process except on paratergal plate 3 (fig. 3), rather than being the longer as in *enormis*. The abdominal spiracles of both sexes are much larger than in Ferris's (1921, Stanford Univ. Publ. Biol. Sci., I(2): fig. 59B) drawing of *enormis*. The male genitalia of *enormis* were not described. Male genitalia of *spiculifer* (fig. 5) with basal plate (B.P.) longer than parameres and pseudopenis; parameres (PAR.) slender, evenly and broadly convex; pseudopenis (PS.P.) extending posteriorly well beyond apices of parameres, diverging broadly, its widest point about at posterior third of parameres.

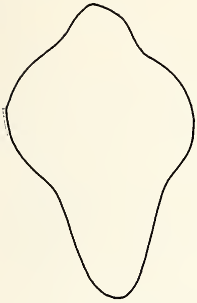
Specimens examined—Two ♀♀ *ex Lemniscomys barbarus,* French Morocco, Casablanca, Tit Mellil, 20 January 1956. Three ♂♂ 3 ♀♀ *ibid.* but 31 March 1956. One ♂ and one ♀ retained in U. S. National Museum collections; remaining specimens returned to British Museum of Natural History.

EXPLANATION OF PLATE III

Hoplopleura spiculifer (Gervais, 1844) Fig. 1. Thoracic sternal plate, female. Fig. 2. Dorsal and ventral views, female. Fig. 3. Paratergal plates 2–8, male. Fig. 4. Paratergal plates 2–8, female. Fig. 5. Aedeagus, ventral view.

BULL. B. E. S. VOL. LII PLATE III

1



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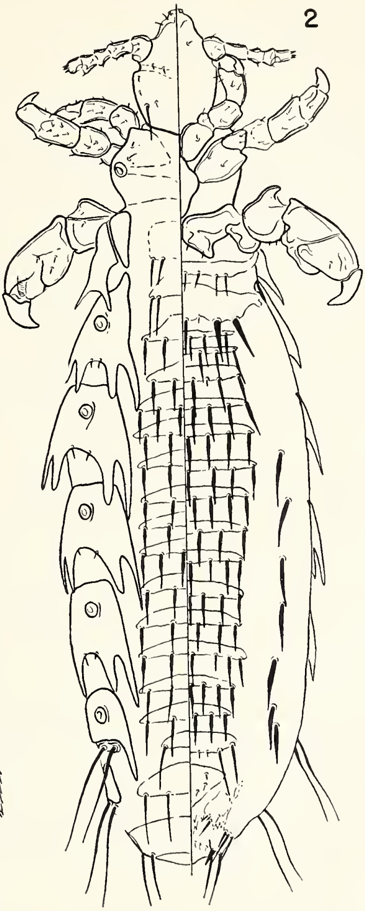

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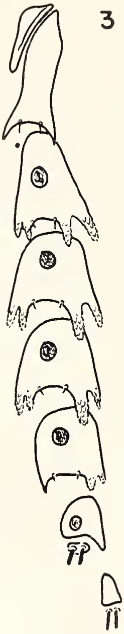

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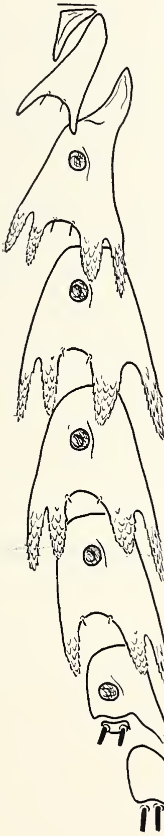

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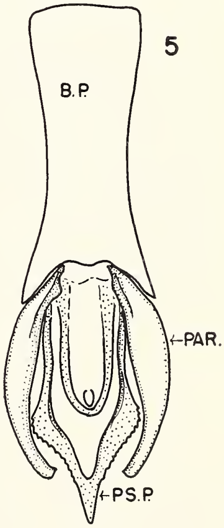

PUBLICATIONS RECEIVED

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Nematodes, their kinds and characteristics, by B. G. Chitwood and W. Birchfield. 49 pp., 22 plates. 6 x 9 ins., paperbound. 1956. Published as Bulletin 9 of the State Plant Board of Florida, Gainesville, Florida.

Florida Beekeeping, by Roger A. Morse. 113 pp., 43 photographs. 6 x 9 ins., paperbound. 1956. Published as Bulletin 10 of the State Plant Board of Florida, Gainesville, Florida.

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Vol. LII APRIL, 1957 No. 2

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BULLETIN

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Vol. LII APRIL, 1957 No. 2

DESCRIPTIONS OF TABANIDAE PREVIOUSLY KNOWN FROM ONE SEX ONLY (DIPTERA).

By L. L. Pechuman, Lockport, New York

Each of the following descriptions is based on an individual specimen which is labeled with a reference to this publication.

Esenbeckia triangularis Philip

Male, 14 mm. 13 miles SE Acatlan, Puebla, Mexico, 4900 ft., 10 July 1952 (E. E. Gilbert and C. D. MacNeil). This specimen was compared with the holotype female by Dr. C. B. Philip and found to agree except for usual sex differences. The antennae are completely orange-red. The second palpal segment is extremely short and narrow, reddish brown, with black hairs and a few pale hairs. The face below the antennae is swollen and subshining; the beard is yellow. The yellow haired thorax is blackish on the dorsum but yellowish near the wing bases. All coxae and femora are blackish brown with the fore and middle femora showing some yellow apically; fore and middle tibiae and tarsi yellow and hind tibiae and tarsi reddish brown; hairs of legs mostly black but with some yellow hairs present. The wings are lightly infuscated and this becomes deeper in color in the vicinity of the first basal cell; the costal cell is deep yellow. The first three tergites are yellow, the first with a dark spot beneath the scutellum, the second with a dark inverted median triangle at the base with the point reaching about half way across the tergite, the third with a dark spot on the anterio-lateral margins; fourth and following tergites black with narrow pale posterior borders. All tergites with black and yellow hairs with most of the latter along the lateral margins and posterior borders. First three sternites yellow with mostly yellow hairs; remaining sternites black with mostly black hairs.

In Philip's (1954) key to *Esenbeckia* males, *triangularis* would key to couplet 52 which includes *incisuralis* (Say) and *incisuralis tinkhami* Philip. *E. triangularis* may be separated from both these forms by the very small palpi, swollen subshiny face, longer proboscis and predominantly black haired legs.

Chrysops flavida celata Pechuman

Male, 8 mm. Lakehurst, New Jersey, 16 June 1917 (L. B. Woodruff). Very much like the female except for the usual sex differences. Face, palpi, first two antennal segments and base of third yellow; annuli dark brown. Legs yellow except for apices of fore and hind tibiae which are brownish. Thorax greenish gray with brown stripes. Wing pattern as in the female and with outer margin of crossband somewhat sinuate. The abdominal pattern is the same as in the female but the dark markings are more accentuated than in most females.

The male of *celata* can be separated from *flavida* Wied. and subspecies *reicherti* Fairchild by the greenish thorax and additionally from *reicherti* by the more restricted apical spot, the dark area of the second tergite not flattened and the yellow of the second tergite not tinged with green. Of other related forms, it may be separated from *dimmocki* Hine by the yellow legs and greater extent of yellow on the abdomen, from *cursim* Whitney by the saturate crossband with a sinuate outer border and from *pudica* O.S. by the paler hind femora, broader apical spot and greater extent of yellow on the abdomen.

Chrysops flavida reicherti Fairchild

Male, 8 mm. Oneco, Manatee Co., Florida, 25 March 1955 (D. M. Anderson). The male of *reicherti* is easily associated with the female. It is distinguished from males of *flavida* Wied. collected at the same time by its darker color, greenish tinge of the abdomen which is most noticeable on the second tergite, flattened dark marking on the second tergite and greater extent of the apical spot. The thorax is dark yellow with dark brown stripes, The apical spot of the wing is very extensive and surrounds the hyaline triangle which does not reach the wing margin. The hyaline triangle appears as a circular spot in the first submarginal cell and is separated from the rest of the hyaline triangle by an infuscated area in the first posterior cell connecting the crossband and the apical spot; the balance of the hyaline triangle is restricted to portions of the second and third posterior cells. The first two antennal segments are reddish brown, the third segment is dark brown with the annuli nearly black. The legs are pale reddish brown except the hind femora and tibiae which are dark reddish brown. The abdominal pattern is much like that of the female; the pale area of the second tergite has a distinct greenish tinge and the median dark marking is flattened so that it reaches only half way across the segment. The first two sternites are greenish yellow without markings, the third and fourth each have a large black median spot and the fifth and following sternites are black with a narrow pale posterior border.

Females of *reicherti* collected at the same time as the male have a more extensive apical spot than is found in most specimens studied from other localities. It is possible, therefore, that the male described above may have the apical spot more extensive than is usual in this sex.

Chrysops montana perplexa Philip

Female, 8 mm. Welaka, Florida, 1 May 1955 (H. E. Evans). The female of this form does not differ in any essential way from many *montana* O.S. studied except in the size of the apical spot which is very extensive. The apical spot surrounds the hyaline triangle which is reduced to a small circular spot in the first submarginal cell and a narrow stripe in the first, second and third posterior cells. The hyaline triangle reaches the wing margin only as a subhyaline area in the third posterior cell.

This specimen was kindly compared with the holotype male of *Chrysops montana perplexa* by Dr. C. B. Philip who found it differed only in sex characters. The black markings of the abdomen, both dorsally and ventrally, are less extensive than in the male but this reduction is the same as is found in typical northern females when compared with associated males.

Stenotabanus floridensis (Hine)

Male, 11.5 mm. W. Palm Beach, Florida, 10 March 1920. Head large, broader than thorax. First two antennal segments pale yellow with black hair; base of third antennal segment dark yellow, annuli black. Annulate portion of antennae distinctly shorter than basal portion; basal portion with a rounded dorsal angle but almost no trace of a dorsal excision. Second palpal segment pale yellow with white hair, almost cylindrical in shape, about two and one half times as long as wide and blunt at tip. Tip of frontal triangle brown; rest of frontal triangle, the area of the subcallus and genae pale gray pollinose with rather long white hair on the genae. Vertical triangle gray, laterally compressed and reaching level of eye. Post ocular rim of eye with long gray hairs which curve forward. Upper eye facets enlarged and occupying about two thirds of eye area; line of demarcation between large and small facets distinct.

Thoracic stripes present but obscured by long gray and a few dark hairs which cover dorsum and lateral margins of thorax and scutellum. Pleurae gray with long gray hairs. Legs yellowish red with fore femora and most of fore tibiae and tarsi somewhat darker. All coxae with long white hairs; fore femora with mostly black hairs and middle and hind femora with mostly white hairs; all tibiae with black and white hairs which are quite long on the middle and hind tibiae. Wings hyaline; subepaulets bare.

Abdomen much like that of the female but with pale areas reduced in size; dark brown with a small yellowish gray median triangle on the first tergite, larger median triangles on the second and third tergites and only traces of such triangles on the fourth and following tergites. Oval sublateral pale spots which reach the posterior margin are present on the second, third and fourth tergites. Lateral margins of first tergite and posterior lateral margins of second, third and fourth tergites grayish. Abdominal hairs black except over the pale areas and extreme posterior and lateral margins where they are gray. Venter gray with gray hair.

Although the male of *St. floridensis* should be rather easily associated with the female, it also has a superficial resemblance to the males of *Tabanus pumilus* Macq., *T. sparus* Whitney and *T. sparus milleri* Whitney. The specimen of *St. floridensis* described above would be separated at once by the bare subepaulets but since this is a variable character in the female, it is possible it may be variable in the male also.

From the males of *T. pumilis, T. sparus* and *T. sparus milleri,* the male of *St. floridensis* may be separated by the long hairs on the post ocular rim, the gray pollinose subcallus which is brown in the species mentioned above, somewhat more slender second palpal segment, long white hairs on the thoracic dorsum and yellowish red femora.

Tabanus abdominalis Fabricius

Male, 20 mm. Highlands Hammock, Highlands Co., Florida, 10 May 1955 by H. E. Evans as prey of wasp *Bembix texana* (Cress.). The male of *T. abdominalis* is predominantly orange and black and readily associated with typical females of the species. First antennal segment black with black hair, second dark orange with black hair and third completely orange-yellow with annuli shading to a deeper color. Upper eye facets somewhat enlarged and occupying slightly more than half of total eye area. Palpi black with black and a few yellowish hairs; second segment blunt at tip. Pollen and hairs of face and cheeks yellow; beard yellow. Stripes of thorax very distinct; pleural hairs mostly yellow but with patches of black hairs. Legs black except for basal one third of fore and basal two thirds of middle and hind tibiae; hairs of legs black except for long pale hairs on all coxae and some orange hairs on pale areas of tibiae. Color and markings of wing as in female; first posterior cell narrowly open at margin. Abdomen mostly orange with black markings on all tergites; black marking on first tergite restricted to a small spot beneath scutellum; second, third and fourth tergites with a rather small black median spot on the anterior border which reaches about half way across the segment and with a very small spot on the extreme anterio-lateral margin which is larger on the fourth than on the second and third; on the fifth and sixth tergites the dark spots have coalesced to form a black band across the segment restricting the orange to a narrow posterior border which is broadest laterally. Abdominal hairs mostly black except laterally and along posterior margins of segments where they are yellow. On the second, third and fourth tergites the area of yellow hairs has a tendency to expand into faint mid-dorsal triangles. It is probable that with less perfectly preserved specimens than the one at hand, these would not be noticeable. First five sternites orange-yellow except for a very small black spot in the center of the lateral border on the third, fourth and fifth sternites; sixth sternite dark with a pale posterior margin; seventh sternite largely dark; hairs of venter mostly yellow.

T. abdominalis would key to couplet 15 in Stone's (1938) key to *Tabanus* males but would go no further since it does not agree with either choice of characters in the couplet. From *T. fumipennis* Wied., which keys out in couplet 15, it is at once distinguished by the dark legs and palpi and by the dark median abdominal spots not forming a continuous stripe. Rubbed specimens of *T. gladiator* Stone and *T. sulcifrons* Macquart, which may not show the usual pale mid-dorsal abdominal triangles, do not have the wings as deeply infuscated, the femora are not as deeply black, the tibiae are more extensively yellowish, the thoracic stripes are not as distinct and in the case of *gladiator* the eye facets are not differentiated.

Tabanus coarctatus Stone

Male, 15 mm. Highlands Hammock, Highlands Co., Florida, 10 May 1955 by H. E. Evans as prey of the wasp *Bembix texana* (Cress.). The male of *T. coarctatus* is readily associated with the female. The thorax and wings are same as in the female as well as the dorsal and ventral abdominal pattern except that the pale markings are somewhat more extensive than in most females. The legs are pale reddish brown except for the tarsi which are brown. The antennae match those of the female in having the first two segments yellowish with black hairs and the third segment black except at the extreme base. The upper eye facets are enlarged but not markedly so and occupy over half of the total eye area; the line of demarcation between large and small facets is quite distinct. The pinkish white second palpal segment is unusual in that it is swollen at the base and tapers at the tip to an acute point which is somewhat decurved; the palpal hairs are white.

In Stone's (1938) key to male *Tabanus, T. coarctatus* would go to couplet 26. From all related species except *T. equalis* Hine, it would be separated by the combination of pale legs and black third antennal segment. From *equalis,* which is usually a larger species, it may be separated by the darker costal cell, paler scutellum, broader pale abdominal bands, almost completely black third antennal segment which has scarcely a trace of a dorsal excision and a stubby rather than slender terminal annulus. *T. equalis* seems to be the only other species in this group with the second palpal segment swollen at the base and an acute tip.

Literature Cited

Philip, Cornelius B. 1954. New North American Tabanidae. VIII. Notes on and keys to the genera and species of Pangoniinae exclusive of *Chrysops.* Rev. Brasil. Ent. **2**: 13–60.

Stone, Alan. 1938. The horseflies of the subfamily Tabaninae of the nearctic region. U.S.D.A. Misc. Pub. 305: 1–171.

NOMENCLATORIAL CONSIDERATIONS IN THE FAMILY LYGAEIDAE (HEMIPTERA: HETEROPTERA).

By James A. Slater,[1] Storrs, Connecticut

During the course of some recent nomenclatorial work on various groups within the family Lygaeidae a number of situations have arisen that appear to involve re-interpretation or junior homonymy. A number of such cases are discussed below and action in regard to homonymy taken where considered unavoidable.

I. The subfamily name Rhyparochrominae

China & Miller (1955, Ann. Mag. Nat. Hist. (12): 8: 259) in a recent check list of family and subfamily names in the Heteroptera use for the largest of the lygaeid subfamilies the name Rhyparochrominae Stal (1862. Ofv. Vet. Akad. Forh. 19: 210). Unfortunately Stal based his subfamily upon *Rhyparochromus* Curtis and this generic name is a junior homonym and thus is not available as the stem of the subfamily and tribal names.

Rhyparochromus Curtis 1836 takes *Lygaeus chiragra* F. 1794 as type species. *Rhyparochromus* Hahn 1826 the senior homonym takes *Cimex pini* L. 1758 as type species. These two species pertain to different tribes and certainly with family group names now considered as coordinate it is impossible to base a subfamily name upon an entirely different type genus than that utilized by the original proposer of the taxon even though both type species are in the same subfamily at the present time.

The next available name for *Rhyparochromus* Curtis *nec* Hahn) is *Megalonotus* Fieber 1860. The Copenhagen Decisions (par. 54, pg. 36) state that where a type genus of a taxon belonging to a family group is found to be a junior homonym, the name of that taxon is to be changed to a name based upon the changed name of its type genus.

Thus the subfamily previously known as Rhyparochrominae and the tribe known as Rhyparochromini must be called Megalonotinae and Megalonotini respectively.

The genus *Rhyparochromus* Hahn (*nec* Curtis) belongs to the tribe Beosini and in general represents the same concept as *Aphanus* of authors (*nec* Laporte).

---

[1] University of Connecticut.

II. *Thunbergia* Horvath 1914

This name was first used as a subgenus of *Caenocoris* Fieber but must be considered as a junior objective synonym of *Melanostethus* Stal 1868 as both have, by monotypy, the same type species, *Lygaeus marginatus* Thunberg 1822.

III. *Neoligyrocoris* Barber

This name was first used by Barber as a subgenus of *Ligyrocoris* Stal but is a junior objective synonym of *Pseudopamera* Distant as both have the same type species, *Pseudopamera aurivilliana* Distant. Type of *Neoligyrocoris* was fixed by original designation, that of *Pseudopamera* by monotypy.

IV. Preoccupied generic group names

Replacement names are proposed here for those genera considered at the present time as zoologically valid genera. Those preoccupied names in synonymy are not renamed, but attention, is called to such cases in the event subsequent systematic work necessitates changes in generic concepts.

a. *Cryptocara* Bergroth 1916. (Wien. Ent. Zeit. 35: 221).

This name was proposed as a replacement name for *Rhodesia* Distant 1911 (preocc.). However, *Cryptocara* Bergroth is itself preoccupied by Gistel 1857 (Vacuna 2: 522) in the Coleoptera. New name proposed: *CRYPTOCARELLA.* Type species: *Rhodesia durbani* Distant, 1911. Monobasic.

b. *Xestonotellus* Horvath 1914. (Ann. Mus. Nat. Hung.
12: 629).

This name was proposed as a subgenus of *Scopiastes* Stal. However, it is preoccupied by Reuter 1905 (Ofv. Finsk. Vet. Soc. Forh. 47: No. 20: p. 1) in the Miridae. New name proposed: *SCOPIASTELLA.* Type species: *Scopiastes cruentus* Horvath 1914. Fixed here.

c. *Macropterna* Fieber 1860. (Europ. Hemip. pp. 53 & 206).

This name is preoccupied by Hitchcock 1848. (Mem. Amer. Acad. N.S. 3: 233) in the Amphibia. New name proposed: *MACROPTERNELLA.* Type species: *Oxycarenus inermis* Fieber 1851. Fixed by Oshanin 1912. Kat. Palearct. Hemip. p. 32.

d. *Gonatas* Distant 1882. (Biol. Centr. Amer. Heter. 1: 219).

This name is preoccupied by Kaup 1871 (Berlin Ent. Zeit. 15: 50) in the Coleoptera. New name proposed: *GONATOIDES*. Type Species: *Gonatas typicus* Distant 1882. Fixed by use of *"typicus"* for originally included species.

e. *Bryanella* China 1930. (Ins. Samoa Pt. 2: 135–6).

This name is preoccupied by Blair 1928 (Ins. Samoa Pt. 4: 83) in the Coleoptera. The describer Dr. W. E. China has kindly asked me to rename the genus. New name proposed: *BRYANELLOCORIS*. Type species: *Byranella longicornis* China 1930. Monobasic.

f. *Macrorhamphus* Jakovlev 1876. (Troudy Ent. Ross. 9: 218–220).

This name is preoccupied by Leach 1816 (Syst. Cat. Mamm. Birds Brit. Mus. 31) in birds. Actually the name appears to have been first used ,as a possible misspelling, by Fischer 1813. (Zoognosia 1: 91) in the fishes. Since *Macrorhamphus* Jak. is a junior synonym of *Orsillus* Dallas it is not replaced here. It should be noted however that the two generic names are not based upon the same type species.

g. *Myersia* Evans 1929. (Bull. Ent. Res. 19: 353).

This name is preoccupied by Viereck 1921. (Proc. U.S.N.M. 43: No. 1942: 575) in the Hymenoptera. However, since *Myersia* Evans is a junior objective synonym of *Rhypodes* Stal it need not be renamed.

h. *Opthalmocoris* Montandon 1907. (Ann. Mus. Nat. Hung. 5: 89–90).

This name is preoccupied by Zetterstedt 1838 (Ins. Lapp. p. 280) in the Miridae. As *Opthalmocoris* Montandon is at present considered as a junior subjective synonym of *Germalus* Stal it is not renamed.

i. *Polyacanthus* Laport 1833. (Mag. Zool. 1: Supp. 1: 83–4).

This name was proposed as a new name for *Microtoma* Laporte 1833 (*ibid* p. 33–4) but is itself preoccupied by Kaup 1827 (Isis, Oken, p. 622) in the fishes. Since *Polyacanthus* Laporte is at present considered a junior synonym of *Aellopus* Wolff 1811 it is not renamed.

j. *Acanthocnemis* Signoret 1865. (Ann. Ent. Soc. Fr. p. 124).

This name is preoccupied by Hawle & Corda 1847 (Prod. Mon. Bohm. Trilob. 20) in the trilobites and by Blanchard 1852 (in Gay, Hist. Chile 7: 355) in the Diptera. Since *Acanthocnemis* Signoret is a junior subjective synonym of *Neurocladus* Fieber 1861 it is not renamed.

k. *Ancylopus* Flor 1860. (Rhynch. Livl. 1: 226).

This name was proposed as a replacement name for *Platygaster* Schilling (*preocc.*) but is itself apparently preoccupied by Agassiz 1846 (Nomen. Zool. Index Univ.) in the Coleoptera as an emendation for *Agcylopus* Chevrolat 1835. Since *Ancylopus* Flor is a junior objective synonym of *Gastrodes* Westwood 1840 it is not renamed.

Heavy Corixid Flight—Some years ago I observed a tremendous flight of Corixidae coming to large light in the Utah Hot Springs area, northwest from Ogden, Utah. On the night of August 21–22, 1956, a black-light trap attracted a great flight of *Corisella decolor* (Uhler). When this trap was checked in the morning, it was well filled with insects into the neck of the two-quart cyanide bottle. The contents were estimated to be 98 per cent Corixidae, by volume. Dr. R. I. Sailer, who examined a sample of 200 of the specimens, made the identification. Many times during the summer operation of this particular light trap, collections of 25 to occasionally more than 300 corixid specimens were taken. This trap light was one of three operated to collect corn earworm moths in particular.—GEORGE F. KNOWLTON, Logan, Utah.

NOTICE

A special sale of all overstock reprints of articles which have appeared in the new series of **Entomologica Americana** since 1926 is now in progress. A price list may be obtained from George S. Tulloch, 22 East Garfield Street, Merrick, N. Y.

NEW SPECIES OF PENTATOMIDAE FROM NORTH AND SOUTH AMERICA (HETEROPTERA) II.

By Herbert Ruckes,[1] New York, N. Y.

The preceding part under this title appeared in 1957 (Bull. Brooklyn Ent. Soc., 52: 16–24). The various ratios given in the descriptions are dimensions measured through a binocular microscope, using a × 2 objective and a × 9 ocular fitted with a micrometer scale divided into one hundred linear units; they are not in terms of millimeters except as mentioned in connection with the holotypes and allotypes.

Tribe Pentatomini

Peribalus fulvipes n. sp.

A broadly oval, relatively robust species for this genus; uniformly fuscous above with the exception of the anterolateral margins of the pronotum and the apex of the scutellum which are dull ivory-orange and the connexivum which is alternated black and dull fulvous. Rather densely and irregularly punctured, the piceous punctures hardly in contrast with the dark background.

Head slightly wider through the eyes than long (45 × 40) with five-eighths of the head produced before a line through the anterior margins of the eyes; in related species the head is produced only about half its length before that line; surface vaguely rugose; juga slightly longer than the tylus but not contiguously apically, leaving a small rectilinear sinus there; ante-ocular margins somewhat more sinuate than in allied species. Antennal ratios: 12/15/17/20/29, i.e. the segments becoming progressively longer, with the fifth segment almost twice as long as the second; basal three segments fulvous, the apical two dark brown to fuscous.

Pronotum two and a half times as wide across the humeri as long medianly; anterior margin behind the head forming more of a continuous transverse arc rather than a subrectilinear border, the latter best seen in *limbolarius* and *piceous;* anterolateral margins pale fulvous or ivory-orange, impunctate and somewhat thickish, perfectly straight without evidence of arcuation; humeral angles bluntly rounded; disc vaguely transversely rugose.

Scutellum as wide across base as long medianly (65 × 65), the margins behind the point where the frenum ends more or less

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[1] Research Associate, Department of Insects and Spiders, the American Museum of Natural History, and Professor Emeritus, the City College of New York.

parallel, the apex broadly rounded, light fulvous or orange-ivory in color, its tip impunctate. In most New World species the scutellum is usually slightly longer than wide across the base and the posterior margins tend to converge, producing a less broadly rounded rounded apex (sometimes even acute) which may or may not be impunctate at its tip. Elytra very evenly and moderately punctate with no congestion of the punctures evident; elytral membrane transparent rich brown or dark casteneous. The connexivum contrasingly alternated dull fulvous and black, the black bands just about reaching the lateral margins of the segments so that there is no well-defined pale margin to the abdomen.

Abdominal venter dull fulvous to orange-brown with two longiutdinal zig-zag bands of black punctures laterally on each side of the disc; remainder of the surface conspersed with black, fuscous and rufous punctures except medianly, which area is pale and impunctate. Legs strikingly fulvous, concolorous except for the presence of a few scattered, inconspicuous reddish punctures on the femora and tibiae; tarsi slightly darker. Rostrum reaching at least the base of the third (second visible) abdominal segment, dull fulvous with most of segment IV piceous. In allied species the rostrum does not reach beyond the posterior coxae, sometimes not that far, and the segments are usually pale with only the tip of IV fuscous.

Lateral angles of the male genital segment obtusely rounded and produced posteriorly; a conspicuous subcircular impression below the apical margin which is transversely like that in *abbreviatus*. In the female the sixth ventral segment bears a pair of irregular, triangular blotches medianly near the apical margin.

Described from three specimens as follows:

Holotype: Male: 9.0 mm. long; 5.0 mm. wide across humeri. Lake George, Warren County, New York. August 22, 1893. Collector, J. L. Zabriskie. Deposited in the American Museum of Natural History.

Allotype: Female: 9.75 mm. long; 6.0 mm. wide across humeri. Lake George, Warren County, New York. August 22, 1893. Collector, J. L. Zabriskie. Deposited in the American Museum of Natural History.

Paratype: Female: Same data as above.

This species is apparently related to *P. abbreviatus* Uhler due to the similarity of puncturation, proportions of the pronotum, the alternation of colors on the connexivum, and the superficial appearance of the male genital segments. It differs from that species, however, by its deep brown color, the proportionately longer head, the more contrastingly colored antennal segments, the equilateral scutellum, the greater length of the rostrum, the rich fulvous color of the legs, the almost fuscous elytral membranes, the zig-zag black bands on the venter, the failure of the juga to overlap apically, and in its eastern distribution. No other species with which I am familiar has the characteristics set forth for *P. fulvipes.*

Neottiglossa corona-ciliata n. sp.

Closely related to *Neottiglossa cavifrons* Stal and *N. sulcifrons* Stal but slightly more broadly elliptical and much darker in color. Over-all dark fuscous to piceous dorsally and concolorous piceous ventrally, the antennae, legs and rostrum, fulvous. Punctures slightly larger and denser than in allied species.

Head piceous, anterior five-eighths very strongly declivent (almost at right angles to the long axis), the margins before the eyes hardly sinuate and the apex distinctly semicircular, not angular as in *cavifrons;* the impression on the declivent portion of the disc very deep, circular in outline and the tumid margins provided with a broad circlet (corona) of incurving, silvery ciliary hairs; the disc slightly more tumid just before the eyes; ocelli four times as far apart as each is from its adjacent eye; the vertex coarsely and irregularly punctate, almost pitted; a small obsolescent paler calloused spot entad of each ocellus; antennae fulvous darkening very slightly distally; segmental ratios: 5/8/5/8/13 or about the same as in *cavifrons* and *sulcifrons.*

Pronotum twice as wide across the humeri as long medianly (60 × 30), dark bronze to fuscous centrally, piceous laterally; punctures piceous throughout, those between the anterior border and the cicatrices somewhat smaller and congested, especially laterally; a very narrow median linea and a small spot behind each cicatrix, laevigate dull yellow; anterolateral margins essentially straight and thin, punctured to the margin and as seen from above not broadly ivory calloused as in *cavifrons* and *sulcifrons;* only when viewed laterally does a very narrow, sordid ivory laevigate linea show along the margin.

Scutellum fuscous to piceous, only vaguely castaneous laterally, as long as wide across the base (41 × 40), an elongate sordid ivory or yellow laevigate calloused spot present entad of each basal angle, as is common for all American species; apex broadly rounded as in *sulcifrons,* not as acutely rounded as in *cavifrons.* Hemelytra fuscous paling to dark bronze laterally; densely and rather evenly punctured, the apical external angle more narrowly rounded than in other species; membrane hyaline, the veins not contrastingly colored. Connexivum barely exposed, concolorous piceous and as seen from above not at all or very narrowly ivory margined.

Venter concolorous piceous, only the abdominal lateral margin narrowly laevigate ivory. Legs uniformly fulvous, the coxae and tarsi slightly darker. Rostrum fulvous, the apical segment slightly darker and reaching the metacoxae.

Female genital plates similar to those in closely related species.

Described from two female specimens.

Holotype: Female: 5.0 mm. long; 3.0 mm. wide across the humeri. Tenaha, Shelby County, Texas. May 9, 1952. Cazier, Gertsch and Schrammel collectors. Deposited in the American Museum of Natural History.

Paratype: Female. Louisiana, Lincoln County, five miles east of Ruston. May 8, 1952. Other data same as above.

While it is inadvisable to describe a new species from only two female specimens, the author feels that there are sufficiently distinctive characteristics shown by these individuals to warrant giving them a specific name. The close relationship to already known species has been indicated in the above description. The semicircular apex of the head, the deep circular impression, on the anterior declivent portion of the head, with its circlet of incurving silvery hairs (from which feature the specific name *corona-ciliata* is derived) and the relatively small amount of light coloring on the body, except for the appendages, are characters that readily separate this new species from others in the genus.

Thyanta picturata n. sp.

About the size and shape of *Thyanta antiguensis* (Westwood) and obviously related to that species but markedly different in puncturation and color pattern. Background color sordid ivory overlaid with localized clusters of piceous punctures; a vague broad, longitudinal pale band from the vertex of the head to the apex of the scutellum.

Head not much (about one-tenth) wider through the eyes than long medianly (33 × 30), densely and deeply punctured with some evdience of congestion as in *antiguensis* and likewise sinuate before the eyes; apex narrowly rounded; ocelli small and twice as far from the inner margins of the eyes as the diameter of an ocellus; clusters of piceous punctures just before the eyes, on the inner apical areas of the juga, on the base of the tylus and on each side of the vertex adjacent to the ocelli; median disc of the vertex sordid ivory.

Antennal segmental ratios: 7/12/11/15/18, i.e. segments I and II subequal and segment V one and a half times as long as segment II; segments I and II sordid yellow, the others light brown, paler at their bases.

Pronotum two and a third times as wide across the humeri as long medianly (70 × 30); anterolateral margins straight, the humeri obtusely rounded and not at all produced; clusters of piceous punctures distributed as follows: subrotund clusters, one each side of the median line just behind the vertex of the head, one behind each eye, one at the posterior lateral angle of each cicatrix; four to six irregular, coalescing clusters across the posterior disc between the humeri; a few small, scattered, piceous punctures just inside the anterolateral margins. Other punctures fuscous to ivory. A vague median laevigate ivory line present.

Scutellum short, about one-fourth wider at the base than long medianly (45 × 35), coarsely but evenly punctate with four clusters of piceous punctures subequally spaced across the anterior margin, the basal angles sordid ivory, a pair of vague broad, irregular bands of piceous punctures running longitudinally through the disc each side of a median broad, sordid ivory band; apex sordid ivory, short and obtusely rounded as in *antiguensis;* the frenum ends between two-thirds and three-fourths of the distance from the base. Elytra shallowly and sparsely ferruginous punctured, a few substellate ivory points scattered about, mostly on the embolium; membrane hyaline with a few pale brown dots mostly basally placed. Connexivum narrowly exposed, its inner margin narrowly outlined in fuscous or piceous; the abdominal incisures narrowly banded in fuscous or piceous and the posterior margins of the abdominal tergites bordered with piceous.

Venter sordid ivory or dull yellow with rufous punctures moderately scattered over the abdomen, some finer and denser ones submarginally; a broad longitudinal, irregular band of slightly larger fuscous punctures extending on each side of the venter from beneath the antennal tubercles across the pleura to the last abdominal segment; a small marginal piceous spot on each side of the abdominal incisures and an inner row of black points, one behind each spiracle. Legs sordid yellow, the femora and tibiae with a few minute ferruginous punctures; setae of the legs short, not longer than the lateral diameter of the tibia. Rostrum sordid yellow, the apex fuscous and extending slightly beyond the metacoxae.

Male genital segment widely open as in *antiguensis,* the apical margin very widely and shallowly V-shaped, the lateral angles somewhat more acute than in *antiguensis;* head of the paramere triradiate with the dorsal and lateral lobes well separated by a distinct sinus; in *antiguensis* the head of the paramere is essentially subtriangular in outline with only a very shallow insignificant sinus (sometimes lacking) between the dorsal and lateral lobes. Basal plates of the female genitalia tumid as in *antiguensis.*

Described from four specimens as follows:

Holotype: Male: 5.75 mm. long; 3.75 mm. wide across the humeri. Tehuantepec, Oaxaca, Mexico. December 13, 1947–January 23, 1948. T. MacDougal, collector. Deposited in the American Museum of Natural History.

Allotype: Female: 6.5 mm. long; 4.0 mm. wide across the humeri. Santa Cruz, Oaxaca, Mexico, February 29, 1948. T. MacDougal, collector. Deposited in the American Museum of Natural History.

Paratypes: Two females: Mexico, Oaxaca, Tehuantepec, December 13, 1947–January 23, 1948. Deposited in the American Museum of Natural History.

As already stated, this species shows very close affinity to *Thyanta antiguensis* (Westwood) by virtue of its general shape, size and proportions of various body parts. There is, however, a great difference in coloring, in the disposition of the puncturation, in the form of the heads of the parameres in the males, in the presence of an inner row of black points on the abdominal venter, and in the presence of the longitudinal, irregular band of fuscous punctures extending the length of the venter on each side of the body.

Thyanta crinita n. sp.

About the size and shape of *T. patruelis* Stal but differing by the absence of the red coloring on head, pronotum, scutellar apex and elytra, and by the produced, acute, slightly elevated, retrorse humeral angles. Overall color olivaceuos to dull green with only an intramarginal band on the anterolateral margins just before the humeri, red or orange-yellow, the apex of the scutellum sordid ivory.

Head very slightly wider through the eyes than long medianly (74 × 70), punctures fine, deep and somewhat congested; margins before the eyes sinuate; vertex much more convex than in *patruelis,* ocelli smaller and each almost twice as far from the inner margin of the eye as the diameter of an ocellus; no reddish coloring on the head. Antennal ratios: 8/18/18/21/20, i.e. the terminal four segments essentially subequal; segments I and II olivaceous to sordid yellow, III, IV and V orange-red darkening apically; terminal three segments finally and densely setose.

Pronotum three times as wide across humeri as long medianly

(100 × 33), densely and quite evenly punctured, a fine transverse rugosity evident across the disc between the humeri; anterolateral margins very weakly sinuate, with a narrow intra-marginal reddish or orange-yellow band gradually widening posteriorly; humeri somewhat produced, triangular, the angles acute and slightly elevated and retrorse, the angles themselves black or fuscous.

Scutellum equilateral (30 × 30), the frenum ending less than two-thirds but more than one-half of the distance from the base; densely and finely punctured with some fine rugosity showing transversely near the base; apex sordid ivory with a narrow marginal area impunctate. Hemelytra quite uniformly punctured, the punctures slightly larger than those of the pronotum and scutellum and more widely spaced; a little congestion evident on the embolium. Membrane hyaline with a few pale tan dots scattered about, the veins vaguely stippled red. Connexivum narrowly exposed, concolorous, only the apical segmental angles narrowly piceous; no transverse dark bands across the incisures.

Venter more dull yellow than olivaceous, especially medianly; rather uniformly and finely punctuate all over, no appreciable median area impunctate as in many species of this genus; apical angles of the abdominal segments narrowly piceous, no inner row of black points behind the spiracles present. Legs sordid yellow or olivaceous, darkening distally, the tarsi rufescent; femora, tibiae and tarsi all prominently setose, most of the setae being much longer than the diameter of the tibia, many shorter ones interspersed. Rostrum reaching slightly beyond the metacoxae, the apical portion piceous, the remainder light brown.

Apical margin of the male genital segment very widely and shallowly U-shaped, not subtended by a chin-like bulge on the ventral portion of the disc as in *patruelis*, but rather flattened there; lateral angles acute but not prominent; posterior surface of the head of the paramere definitely convex and not concave as in allied species, the dorsal apical spur slightly divergent. Female genital plates similar to those of other species.

Described from three specimens.

Holotype: Male: 7.5 mm. long; 5.25 mm. wide across humeri. La Rioja, Argentina. No date. Collector, C. S. Reed. Cornell University Lot Number 605. Deposited in the Cornell University collection.

Allotype: Female: 8.0 mm. long; 5.50 mm. wide across humeri. La Rioja, Argentina. No date. Collector, C. S. Reed. Cornell University Lot Number 605. Deposited in the American Museum of Natural History.

Paratype: Female: Argentina, Mendoza, Portrerillos. March 16–20, 1920. Cornell University Expedition. Deposited in the Cornell University collection.

This new species superficially has the facies of examples of the *maculata-patruelis* complex of species common in South America, as evident by the wide-open aspect of the male genital segment, the prominent humeri, similar proportions of the antennal segments, and green color. It differs, however, from these relatives by being less glossy and by having more acutely angled and retrorse humeri, a greater abundance of long setae on all segments of the legs, and the convexity of the posterior surface of the male paramere. Other differences are shown by the lack of much red on the body and the presence of a much finer puncturation.

Banasa grisea n. sp.

Form broadly oval; over-all color gray, consisting of an old-ivory background overlaid with numerous, somewhat confluent fuscous punctures which are arranged in irregular transverse lines on the pronotum and scutellum.

Head slightly declivent, wider through the eyes than long medianly (55 × 45); densely and very evenly punctured; anteocular margins sinuate and slightly reflexed before the eyes; apex evenly and broadly rounded; ocelli at least four times as far apart as the ocellus is from the eye. Antennal ratios: 10/15/30/27/25, i.e. segment III about twice as long as segment II; antennae concolorous luteous or pale tan, segment V darkening somewhat.

Pronotum more than two and a half times as wide across the humeri as long medianly (115 × 41); humeri vaguely obtusely angled, almost rounded; anterolateral margins slightly arcuate, weakly and irregularly impressed within their borders; surface finely and transversely rugose with the cicatrices (calli) very clearly demarked by a border of evenly spaced fuscous punctures.

Scutellum somewhat longer than wide across base (80 × 70), the frenum ending about two-thirds of the distance from the base; margins of the apical third somewhat parallel and the apex narrowly rounded and punctured in its entirety; punctures on disc arranged in fine, transverse, irregular lines; basal angles minutely fuscous as in *sordida*, not ivory-calloused. Elytra contrastingly punctured, the corium provided with a number of scattered impunctate areas, the clavus and embolium densely and evenly punctured; membrane hyaline with contrasting light brown veins.

Connexivum very narrowly exposed, the inciscures with associated fuscous blotches, similar to those in *B. sordida;* apical angles not at all acute, those of the sixth ventral segment definitely obtuse. Abdominal venter pale, broadly and shallowly furrowed medianly on the second, third, and fourth segments; the median tubercle of the second segment barely developed, almost obsolete; median portion of disc impunctate; laterally with some coarse reddish to fuscous punctures and numerous, very fine ones just within the abdominal margins. Legs concolorous olivaceous brown, becoming slightly darker distally, tarsi darkest. Rostrum exceptionally long, reaching the fourth abdominal segment and lying in the median furrow there; segment III one-quarter shorter than II but one-third longer than IV; segment IV piceous throughout, the others light to medium olivaceous brown.

One of the most distinctive features of this species is found in the structure of the female genital plates; here the basal plates are crudely horseshoe shaped, a pronounced notch appearing on the apical margin of each; each notch is bordered with a raised edge; the two plates are well separated basally, being contiguous only apically; the remaining valves are similar to those found in allied species.

Described from two female specimens.

Holotype: Female: 11.0 mm. long; 6.25 mm. wide across humeri. Chiricahua National Monument, Cochise County, Arizona. July 15, 1948. Collectors C. and P. Vaurie. Deposited in the American Museum of Natural History.

Paratype: Female: Arizona, Cochise County, Southwestern Research Station. August 1, 1955. P. D. Hurd, collector. Deposited in the University of California, Berkeley, California.

This species belongs to that subdivision (*Atomosira*) of the genus which includes the North American species *euchlora, packardi* and *sordida,* and in which the apical angles of the sixth abdominal segments are not accuminate but either rectilinear or obtuse and in which the remaining abdominal segmental apical angles are neither produced nor acute. *B. grisea* differs from *euchlora* by the absence of the calloused ivory spot adjacent to each basal angle of the scutellum; it differs from the other two by its much lighter color, finer puncturation, the concolorous apex of the scutellum, the exceptionally long rostrum, and the antennae in which the third segment is almost twice as long as the second. In addition the female genital plates are unique.

NEW HYDROPTILIDAE (TRICHOPTERA) FROM NEW HAMPSHIRE.

By R. L. Blickle & W. J. Morse,[1] Durham, New Hampshire.

The present paper presents descriptions of two new species and of a previously undescribed female. The holotypes and some paratypes will be deposited in the Illinois Natural History Survey Museum. The remaining paratypes will be retained in the University of New Hampshire Entomological Collection, Durham, New Hampshire.

Oxyethira rossi n. sp.

Male: length from front of head to tip of wings 2.5 mm. Seventh sternite with a short, sharp apico-mesal spur. Eighth segment covered with numerous long setae, especially on the posterior half of the segment. Genitalia as in Fig. 1. Two rows of broad heavy spines present on the ventral surface of the ninth segment. These spines are situated on a circular sclerite just anterior to the claspers. Claspers fused on the meson, the fused portion projecting posteriorly as a sinuate, sclerotized rod, Fig 1A. In ventral view the claspers appear upsilon shaped. Above the claspers is a trilobed plate, each of the outer lobes being tipped with a short seta, Fig. 1B. The subgenital plate, in ventral view, appears as divided arms with a triangular lobe on the distal end of each arm. In lateral view the subgenital plate is broad at the base and tapers to a foot shaped distal end. The arms of the subgenital plate are connected ventrobasally. This ventro-basal connnection passes under the aedeagus. Aedeagus, Fig. 1A, 0.5 mm. long; the spiral process encircles the aedeagus two and one-half times and extends to the end of the main part of the aedeagus.

The aedeagus of this species is similar to *O. novasota* Ross and others having an entwined spiral process. However, it is easily recognized by the peculiarly fused claspers and the shape of the divided subgenital plate.

Holotype male: Bow, N. H. August 5, 1951, light trap.

This species is named in honor of Dr. H. H. Ross in recognition of his invaluable help in our studies of Trichoptera.

Orthotrichia instabilis Denning

This species has been recorded from Florida. Recently a series

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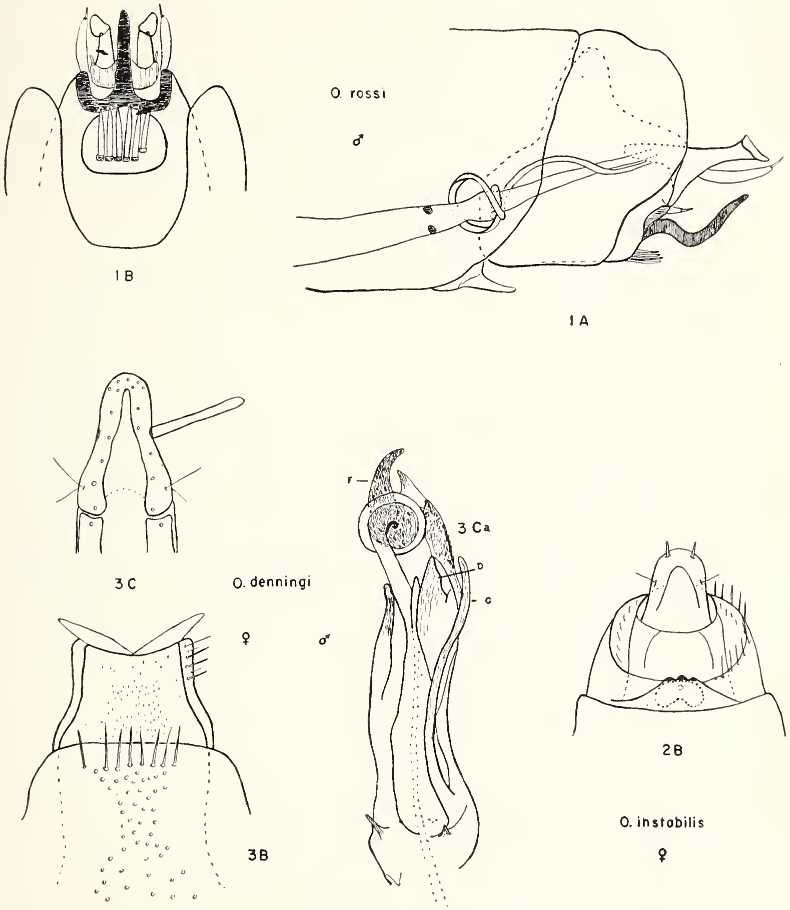
[1] Scientific Contribution #193, published with permission of the Director, New Hampshire Agricultural Experiment Station.

BULL. B. E. S. VOL. LII PLATE IV


1 B
O. rossi
♂
1 A
3 C
O. denningi
♀
♂
F
3 Ca
D
C
2 B
3 B
O. instabilis
♀

Oxyethira, Ochrotrichia and Orthotrichia genitalia. A, lateral view. B, ventral. C, tenth segment, dorsal. Ca, tenth tergite, dorsal.

of specimens have been taken in New Hampshire with the following locality records. Durham, June 16 to August 21, 8 males and 2 females; Lee, July 4 to July 30, 5 males and 10 females; light trap.

Female: genitalia Fig. 2, the eighth sternite with median process flared out. The median process divided into three lobes; the two outer lobes more heavily sclerotized. This species differs from *O. americana* Banks by having the median process of the eighth sternite three lobed. It differs from *O. cristata* Morton in having the median process flared and the mesal portion of the eighth sternite membranous, in addition to the above trilobed mesal process.

Allotype, female. Lee, N. H. July 12, 1948, light trap.

Ochrotrichia denningi n. sp.

Male: length 2.5–3.0 mm. This species is closely related to *O. anisca* (Ross). Tenth tergite, Fig. 3Ca. Process C, slender, extending to tip of process D. Process D, short and stout, about one half its length from the spiral. Process F, as long as width of spiral, no shoulder or process at base of F. A row of small teeth on process E at apex of process C. Two heavily pigmented spines are present at the base of the tenth tergite; one at the base of process B and the other near the base of process C. This species differs from the closely related *O. anisca* (Ross) and *O. contorta* (Ross) by process C being more slender and extending to apex of D; process F without a shoulder or tooth at base and extending a shorter distance beyond the spiral.

Holotype, male: Plymouth, N. H. June 9, 1948, light trap.

Paratypes, males: Plymouth, N. H. June 9, 1948, 2 males; June 10, 1948, 1 male; June 30, 1953, 8 males; July 16, 1956, 1 male.

Female: length as for male; this species is similar to *O. shawnee* (Ross) and *O. anisca* (Ross). Eighth sternite, Fig. 3B, with long broad hairs arranged in an hour-glass pattern; these hairs are numerous on the apical and mesal surface; on the basal surface the hairs are fewer and more widely scattered. Internal structure of eighth segment appears reticulated at 100 × magnification. Tenth tergite, Fig. 3C, with cerci approximately two thirds as long as terminal part of segment. A pair of small bristles present at base of terminal portion of tenth tergite.

Allotype, female; Plymouth, N. H., June 9, 1948, light trap.

This species is named in honor of Doctor D. G. Denning, an outstanding student of Trichoptera.

Light traps have been operated at various localities in the state for the past ten years. It is interesting to note that this species has been taken only at Plymouth, N. H.

FOUR NEW SPECIES OF EUBADIZON NEES FROM WESTERN UNITED STATES (HYMENOPTERA: BRACONIDAE).

By C. F. W. Muesebeck,[1] Washington, D. C.

The species described here belong to that section of the genus *Eubadizon* Nees which comprises parasites of coleopterous larvae and has sometimes been called *Brachistes* Wesmael or *Calyptus* Haliday, both of which names were treated as synonyms of *Eubadizon* by Muesebeck and Walkley (in Muesebeck *et al*, 1951, U. S. Dept. Agr., Agr. Monogr. No. 2, p. 112). Recently Martin (1956, Canada Dept. Agr. Publ. 965, p. 9) has redivided *Eubadizon* and has resurrected *Calyptus* in his key to the genera of the subfamily Blacinae. The characters he has used will not separate the two groups, however; and it may, furthermore, be shown that *Eubadizon* of Martin and other authors is not *Eubadizon* Nees. In fact, if the genus is to be redivided it may be necessary to use *Provancheria* Ashmead for the species that are parasitic on Lepidoptera (the group to which Martin would apply the name *Eubadizon*) and to retain *Eubadizon* for the species that parasitize Coleoptera. At any rate it seems best to reserve judgment on the advisability of using *Calyptus* for such species as those treated here until a critical study can be made of the entire *Eubadizon* complex.

Names for the first and second species described below have been requested for use in connection with biological studies, and I am taking this opportunity to describe two additional related species. All are from the West Coast of the United States.

Eubadizon ernobii n. sp.

Superficially like *americanum* (Cresson) but immediately distinguishable by its broader and non-receding temples, by its black hind coxae, and by the presence of a small median tooth on the anterior margin of the clypeus.

Female.—Length about 3 to 3.5 mm. Head from above not, or barely, twice as wide as long, smooth and shining; temples not at all receding, wider than eyes; clypeus rugulose, its anterior margin with a very small but distinct median tooth; malar space a little longer than median length of clypeus; ocellocular line at least three times as long as diameter of an ocellus; antennae not quite as long as body, usually 26- to 28-segmented, the segments of apical half of flagellum shortened but all still a little longer than broad.

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[1] U. S. National Museum.

Mesoscutum shining; notaulices sharply impressed but not distinctly foveolate and meeting in a small rugulose area which is crossed by a weak median longitudinal carina; the lobes of mesoscutum faintly punctate; prescutellar furrow long and broad and divided by a median longitudinal septum; disc of scutellum small, convex, smooth; propodeum with two large, quadrate, smooth and shining basal median areas that extend beyond basal third and are separated by a strong median longitudinal carina, the surface laterad and caudad of these areas finely rugulose; side of pronotum entirely rugulose; mesopleuron smooth and shining; metapleuron rugulose; first abscissa of radius at least half as long as intercubitus and subequal to second abscissa of cubitus; nervulus usually postfurcal by nearly its own length; nervellus about equal to lower abscissa of basella.

Abdomen about as long as thorax; first tergite slightly longer than broad, closely longitudinally rugulose except medially toward base where it is smooth, the dorsal keels usually distinct only on basal half of the tergite; second tergite slightly longer than third, finely longitudinally aciculate medially, smooth laterally, broadly so on posterior half; suture between second and third tergites very fine, not punctate; third tergite largely or entirely smooth, but often very finely longitudinally aciculate medially on basal half; the following tergites smooth and polished; ovipositor sheath very slender, longer than the body.

Black; mandibles reddish brown; wings hyaline, stigma and veins brown; tegulae dark brown or blackish; anterior and middle legs brown, their coxae above, their trochanters and the bases of their femora, piceous; hind legs with the coxae black or blackish, the trochanters piceous, the femora brown, the tibiae brown, blackish apically, and the tarsi blackish.

Male.—Essentially like the female except that the antennae are a little longer and more slender and the legs are more extensively darkened.

Type.—U. S. National Museum No. 63,503.

Type-locality.—Green Valley Meadow, Cuyamaca State Park, San Diego County, California.

Described from numerous specimens (one female, holotype) reared by Herbert Ruckes, Jr. in 1956 from larvae of the anobiid genus *Ernobius* in cones of *Pinus jeffreyi* taken at the type locality, and from several additional specimens reared by P. D. Sergent from cones of *Pinus ponderosa* collected at Ashland, Oregon and Sisson, California in 1913.

Eubadizon definitum n. sp.

Closely similar to *ernobii,* described above, and sometimes parasitizing the same hosts in cones of the same species of pine. It differs most conspicuously in having the tegulae and all coxae honey-yellow, in the more coarsely and completely striate second tergite, in the deeper and broader suture between the second and third tergites, in the relatively narrower temples, and in the somewhat longer antennae.

Female.—Length usually 3.5 to 4 mm. Head from above slightly less than twice as broad as long, smooth and shining; temples barely receding, very nearly as wide as eyes; clypeus rugulose, its anterior margin with a weak tooth at the middle; malar space a little shorter than median length of clypeus or than basal width of mandible; ocellocular line a little more than twice as long as greatest diameter of a lateral ocellus; antennae 28- to 35-segmented, usually 32- or 33-segmented, the apical third of flagellum tapering noticeably to apex and some of the segments in this portion as broad as long.

Mesoscutum shining, with numerous very shallow but distinct punctures, some of which are confluent; notaulices strongly impressed, broad and foveolate, and meeting in a small rugulose area behind middle lobe, this area not crossed by a weak median longitudinal carina as it is in *ernobii;* propodeum rugulose except for two large basal areas which are smooth, and which are bounded behind by a strong, somewhat arched, transverse carina; side of pronotum rugulose on lower two-thirds, smooth and polished above; mesopleuron smooth and shining; metapleuron finely rugulose; first abscissa of radius a little more than half as long as intercubitus; nervulus usually postfurcal by about half its length; nervellus subequal with lower abscissa of basella.

Abdomen not longer than thorax; first tergite closely longitudinally rugulose striate except for a small basal median area which is smooth, the convergent dorsal keels often obliterated beyond middle; second tergite nearly or quite twice as broad as long, completely longitudinally striate; suture between second and third tergites sharply impressed, deeper and broader than in *ernobii;* third tergite a little shorter than second, longitudinally aciculate at least medially and sometimes largely, smooth and shining along the sides and posteriorly; ovipositor sheath a little longer than the body.

Black; scape brownish beneath toward base; palpi pale; wings hyaline, stigma and veins brown; tegulae yellow; legs, including all coxae, honey-yellow, the hind tibiae and the middle and hind tarsi more or less infuscated.

Male.—Essentially like the female, but the antennae are more slender and do not taper so noticeably, and even the shortest flagellar segments are much longer than broad.

Type.—U. S. National Museum No. 63,504.

Type-locality.—Frederick, Oregon.

Described from numerous specimens of both sexes reared from coleopterous larvae in the cones of *Pinus ponderosa, P. lambertiana, P. jeffreyi* and *P. monophylla* collected at various localities in Oregon and California. The holotype female and several paratypes are labeled as having been reared from *Conophthorus ponderosae* Hopkins at Frederick, Oregon, January 26, 1915, by P. D. Sergent. Other paratypes have been reared by Herbert Ruckes, Jr. in 1956 from species of *Ernobius* in the cones of *Pinus lambertiana* taken in Plumas County, California, and in those of *P. jeffreyi* collected in San Diego County, California.

Eubadizon electum n. sp.

This suggests *strigitergum* (Cushman), another western species, but it may be distinguished readily by its much shorter malar space, the weaker and shorter dorsal keels of the first tergite and its longer ovipositor. In *strigitergum* the malar space is nearly half as long as an eye, the dorsal keels of the first tergite are usually complete and the ovipositor sheath is not longer than the abdomen.

Female.—Length about 5 mm. Head from above not quite twice as wide as long; face more than twice as wide as high, rugulose immediately below antennal foramina, otherwise finely punctate and shining; clypeus nearly three-fourths as long as wide, rugulose, its anterior margin slightly sinuate but without a median tooth; malar space shorter than clypeus or than basal width of mandible and less than one-third the eye height; temples convex, not receding, very nearly as wide as eyes; ocellocular line about two and one-half times as long as diameter of an ocellus; antennae a little shorter than body, tapering slightly to apices, a few of the preapical segments only very little longer than broad.

Mesoscutum finely punctate, shining; notaulices deep but narrow and finely foveolate, meeting behind in a small rugulose area; prescutellar furrow divided into several foveae by prominent longitudinal septa; disc of scutellum with scattered, weak punctures; propodeum closely rugulose, except for two small, smooth and shining areas at base; side of pronotum smooth and shining above the longitudinal impression, rugulose below it, the impression itself crossed by numerous strong rugae; mesopleuron smooth and shining; metapleuron rugulose; hind coxae smooth; first abscissa of radius fully two-thirds as long as intercubitus and longer than second abscissa of cubitus; nervulus very slightly postfurcal; nervellus a little longer than lower abscissa of basella.

Abdomen about as long as thorax; first tergite finely and closely longitudinally rugulose and subopaque, smooth and shining only medially toward base between the dorsal keels, which are weak and fade out near middle of tergite; second tergite longitudinally rugulose aciculate, not distinctly longer than third, the suture between them very fine but sharp and distinct; third and following tergites smooth and polished; ovipositor sheath about as long as thorax and abdomen combined.

Black; clypeus, mandibles and scape and pedicel beneath, reddish or brownish yellow; tegulae and wing bases yellow; stigma and veins largely brown; legs, including all coxae, entirely yellow.

Male.—Essentially like the female. The only male seen has the antennae 34-segmented.

Type.—U. S. National Museum No. 63,505.

Type-locality.—Bly, Oregon.

Described from four females (one, holotype) and one male from the type locality, reared from mountain mahogany, *Cercocarpus ledifolius,* by W. J. Buckhorn, October 31, 1931 under Hopkins U. S. No. 18953-B. There is also in the U. S. National Museum a female specimen of the same species, though not included in the type series, which is labeled as having been reared from *Phymatodes* in maple at Placerville, California, in 1916, by F. B. Herbert.

Eubadizon salicicola n. sp.

This species most closely resembles *atricornis* (Ashmead), but differs in its much longer ovipositor, its almost interstitial nervulus, and the more completely developed dorsal keels of the first tergite.

Female.—Length about 2.5 mm. Head smooth and shining; clypeus more or less rugulose, its anterior margin subtruncate and with no indication of a median tooth; temples gradually receding, a little narrower than the eyes; malar space as long as median length of clypeus; ocellocular line slightly more than twice the diameter of a lateral ocellus; antennae 23- or 24-segmented in the available specimens, a few of the preapical segments barely, or not, longer than broad.

Mesoscutum polished and impunctate; notaulices complete, deeply impressed and rather coarsely foveolate; no rugulose area behind middle lobe; propodeum with two transverse, smooth and polished areas at base separated by a short median longitudinal carina, remainder of propodeum rugulose reticulate and shining; side of pronotum smooth and polished but with some strong rugae crossing the longitudinal impression; mesopleuron smooth and polished; metapleuron rugose; first abscissa of radius fully half as long as intercubitus; nurvulus very nearly, or quite, interstitial.

Abdomen shorter than thorax; first tergite about as broad at apex as long, shiny, longitudinally rugulose laterad of the dorsal keels, smooth between them, the keels prominent and nearly attaining caudal margin of tergite; second and following tergites smooth and polished; suture between second and third tergites very faint; ovipositor sheath about as long as thorax and abdomen combined.

Black; scape and basal segments of antennal flagellum brownish; tegulae yellow; wings hyaline, stigma and veins brown; legs, including all coxae, yellow, the hind tibiae apically and sometimes outwardly, and all the tarsi, infuscated.

Male.—Like the female but with antennae longer and more slender, 28-segmented in the type series, tapering apically, the segments of apical third very slender.

Type.—U. S. National Museum No. 63,506.

Type-locality.—Orville, Butte County, California.

Described from eight females (one, the holotype) and two males reared from larvae of *Dorytomus* sp. (Curculionidae) on willow at the type locality, April 20, 1930, by H. H. Keifer.

Snow Scorpionfly in Northern Utah—Sixty-three adult males and females and at least twenty-six larvae of *Boreus coloradensis* Byers, were recently collected in Cache County, Utah. My wife, Mary, and I collected the first five adults from moss growing on a sizable rock in Spring Hollow of Logan Canyon, October 28, 1956. Later collections in the same area and near the mouth of Blacksmith Fork Canyon, extended the collection period until December 3. Dr. D. W. Davis, W. J. Hanson and Karim Goodarzy joined me on some trips to collect moss while seeking this interesting species.—George F. Knowlton, Logan, Utah.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

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BULLETIN
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THE DEVELOPMENT OF A. S. PACKARD, JR. AS A NATURALIST AND AN ENTOMOLOGIST.

By Ralph W. Dexter,[1] Kent, Ohio

Alpheus Spring Packard, Jr. was born in Brunswick, Maine, on February 19, 1839. His maternal grandfather had been a president, and his father was a professor and also a president at Bowdoin College from which the son graduated in 1861. The following year he received an A.M. degree and in 1864 an M.D. degree from the same institution. Between 1861–64 he studied natural history and served for a time as an assistant under Prof. Louis Agassiz at the Lawrence Scientific School of Harvard University from which he received an S.B. degree. He became a professional naturalist and, like so many naturalists of that day, was active in many phases of science both zoological and geological. His main interest, however, and his greatest contributions were in the field of entomology.

His daughter, Mrs. Frances Packard McClellan, has preserved a copy of portions of her father's dairy and correspondence running from January 1, 1854, to September 22, 1899. It is a two-volume scrap book containing for the most part handwritten copies, made by Packard's wife, of excerpts from the original diary. Unfortunately the original documents are not extant and the portions selected by Mrs. Packard for copy may not always have been the most important ones from a scientific point of view. Nevertheless, enough has been preserved to show the development of one of the great pioneers of American entomology. The writer is greatly indebted to Mrs. McClellan for her whole-hearted co-operation and enthusiastic encouragement in the preparation of this paper on certain aspects of her father's life and career. Herein are presented selected passages from the journal and from corres-

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[1] Kent State University.

JUN 25 1957

pondence chosen to show the development of A. S. Packard, Jr., from a boy fired with enthusiasm for nature study to one of the leading naturalists of his day. Special attention has been directed to early incidents in his life which anticipated later developments of importance as his youthful promise was brought to fruition as an outstanding pioneer in American science. T. D. A. Cockerell, in his article *The Making of Biologists* (1903), concluded that, "I think it will be possible to show in due time, that the critical period for the biologist is much earlier than some of us have supposed, is in fact during the years of childhood." Certainly in the case of Packard his boyhood experiences shaped his future career and anticipated later events of scientific importance.

As a young boy Alpheus Packard, called Alpha by his family, collected and studied the local plants, insects, and shells of his native region. His early enthusiasm for nature remained with him throughout life. At the age of 15 he organized with two of his young friends a small newspaper prepared by hand which they entitled, *The Star of the East.* In the editorial of Vol. 1, No. 1 (March 14, 1854), they wrote, "The object of our paper is to teach us to write and compose better so that if we should ever be called upon to edit a larger paper we should be better fitted for that office." The early experience proved of great value and later Packard was "called upon to edit a larger paper." During his career he wrote over 500 publications, including many books and monographs, and he was editor of the *American Naturalist,* which he and his colleagues had founded, from 1868 to 1888.

In issue No. 11 of Volume 1 (June 1, 1854), a communication from Packard was included which described his visit to Salem, Massachusetts, on May 18. He wrote, "Going down Essex Street you come to the East India Rooms—The Salem Museum. This museum was established by East Indian Captains who bring the curiosities here which are collected in their travels. . . . It would be an endless task to enumerate all the things that are contained in it. Suffice it to say, that it is the largest Museum in the country." Little did he realize then that one day (1867) he would return to Salem to become one of the curators of the newly organized Peabody Academy of Science, which included the old East India Museum, and that some years later he would become its director (1877–78). The same issue contained what may have been Packard's first writing to mention insects, which concludes, "While Europe is being plunged into war—War against the mosquitoes is carried on in Brunswick." From this boyish beginning there later developed one of the most prolific writers in American entomology.

That same year he built a cabinet of natural history for his collections, consisting of shells he collected and miscellaneous curiosities given to him by his family and friends. "Aug. 15, 1854. This morning I went down to Mrs Jackson's and saw Ann J.'s cabinet. It is a very fine one. She gave me some things from the Mammoth Cave, a piece of the Plymouth Rock, some shells, fossils, etc. A valuable addition." Caves and cave life, especially the Mammoth Cave, later became prominent in the scientific investigations of Packard. Some of his studies were *On the Crustaceans and Insects of the Mammoth Cave* (1871); *Cave-inhabiting Spiders* (1875); *The Cave-beetles of Kentucky* (1876); *On a New Cave Fauna in Utah* (1877); *The Fauna of Nickajack Cave* (with E. D. Cope, 1881); *A Cave-inhabiting Flat-worm* (1883); *The Cave Fauna of North America* (1888); *On the Origin of the Subterranean Fauna of North America* (1894).

He developed very early a special interest in shells. On August 19, 1854, he wrote, "Went to Prof. Cleaveland's cabinet and carried over a box of my shells which I named from his. I went down to Mrs. Everett's and she gave me some new kind of shells. . . . September 19, Went over to Mrs. Pierie's and her sister gave me about a pint of small shells. . . . After school I went up to Capt. Adams and they gave me a great many rare shells which will make a fine addition to my cabinet. What room I have for my shells is now brim full and when I get a great many more I shall have to make some new arrangement." Then, on November 14, "Went over to the library and got out Goldsmith's *Animated Nature,* it has something about Conchology in it. . . . November 18, Went over to the libraries and got out one vol. *Edinburgh Encyclopedia.* There is a fine article on Conchology etc. I am going to copy some of it. I think that it is a very interesting study although there are many things that I don't understand. Next summer I mean to hunt around in the river and salt water for shells."

Starting the new year, 1855, he wrote in reminiscence and in prospect, "I have had some very good presents this year. One, a blank book for my Journal . . . also the *Principles of Zoology* by Agassiz and Gould. A valuable book and just the thing I wanted. . . . I mean to do a great deal this year, considerable walking around Harpswell and Topsham to find specimens for my cabinet of minerals and shells. I am reading up now about them. I am very much interested in those studies and my new books will help me very much." Excerpts for the next several days read, "I have been reading a very interesting article in the *North British Review* on Sea-weeds, shells, and polyps, it has given me quite an idea of such things. . . . I am reading now Goodriche's books on *Geology*. . . . Went to the library and got an article on Mollusca, with a life of Cuvier in it, and one volume of Kee's *Cyclopedia* with a volume of engravings, and containing an interesting article on Conchology. I think that I am fortunate about getting books on that subject, which is so interesting to me, but the rest of the family except Osgood (his step-brother) laugh at me about it. . . . I wrote this evening my composition on the life of Cuvier, a very good subject. It is to be read by the committee and visitors on examination day. . . . Read some articles in some old numbers of the *North American Review,* one very interesting on Audubon. . . . Father came home from Boston. He bought me a *Dictionary of Zoology*. . . . I have finished this evening the 1st vol. of *Mollusks* by Binney; it is a fine and superb work."

Packard read all that he could obtain on natural history and on the lives of naturalists. January 20, "Got out one vol. *Naturalists' Library* containing the life of Lamarck and one vol. of *Journal of Science*." In later life Packard advocated a modified form of Lamarckianism to which he gave the name "neo-Lamarckianism" in 1883. With his friends, E. D. Cope and Alpheus Hyatt, he later helped found the school of Neo-Lamarckianism. In 1898 Packard made a special trip to France to gather information on the life and work of this pioneer evolutionist, and in 1901 published his book *Lamarck, the Founder of Evolution, his Life and Work.* The previous year he had written an article on *Lamarck's Views on the Evolution of Man, On Morals, and on the Relation of Science to Religion.* Also, as vice-president of the zoology section of the A.A.A.S. in 1898 he delivered an address entitled, *A Half-century of Evolution with Special Reference to the Effect of Geological Changes on Animal Life* which was Lamarckian in its interpretation.

On January 22, 1855, he wrote, "My book came today, it is a very good one I think, *The Library of Natural History,* compiled from the works of eminent naturalists by A. S. Gould. I am much pleased with it—880 pages, with 400 engravings, not the best however (28 years later Packard became an important contributor to *The Standard Natural History.*). . . . February 5, "Oh! that I could wander around the earth to collect specimens of Natural History! It seems to me that if I could know all about Botany, Mineralogy, Geology, and Conchology and know how to stuff animals and birds and to preserve insects and keep shells that nothing could be more pleasant, provided that I had the finances. I shall increase my cabinet very much next summer I know." Packard was to devote his whole life to natural history and in later life travelled very widely in North America, Europe, and Egypt in the pursuit of his interests in the natural sciences.

On February 10 he continued, "This noon I went over to the two libraries and got out the *Practical Naturalist or Directions for Preserving Objects of Natural History,* a most valuable book for me, I am delighted with it. Next summer I mean to take it out again and try to stuff birds and animals, I mean to collect as many snakes as I can, and other animals, and I shall get some skeletons. . . . I mean to be a Naturalist, and I mean to read every book on Natural History I can lay my hands on. . . . February 16, I went into Parker's shop to get him to make me a hammer like what Prof. Cleaveland is having made to break stones with. I shall want it on my excursions next summer. . . . I am saving what little money I can get to buy me a microscope. . . . February 20, I have finished Hugh Miller's *Old Red Sandstone* and begun on President Hitchcock's *Geology.* The *Old Red Sandstone* is very interesting and instructive. I read it with great interest. I do wish that I could be a geologist." Packard not only became a zoologist and entomologist but also taught and published much in the field of geology. Twenty-three years later he went to Brown University in 1878 as a Professor of Zoology and Geology.

February 22, "Fannie (his sister) received a letter from Charles (his brother) today and it said in it that if I had any interest in Natural History to specify what department and that he would try to obtain specimens for me, and what books on the subject I would like, and that perhaps I would like to have a microscope. This is very fine for me, and he is in a place to procure a great many such things, and books. I shall write him and 'specify'. I have been wanting a microscope for a long time and have been saving up my money to buy one with."

On February 27 and 28 he made his first entries in reference to scientific drawings, "I have drawn a few shells today. I am going to draw a good deal now for I want to be a good draughtsman. . . . I am drawing the St. Lawrence. I have done but little on it yet. I want to draw well, very much, and the only way to do it is to practice a good deal. (He was to make many of the fine drawings illustrating his voluminous publications throughout a long career.) March 3, . . . began to read Brook's *Ornithology.* It promises well, I think I shall learn much from it. . . . March 6, I am going into the College Library tomorrow with father and shall make another haul of fine books. What a blessing are those libraries to me. I have also found up in a gallery a whole lot of books on Natural History, and Botany, Geology, and Mineralogy and I shall read many of them."

When asked what department of natural history he liked best he replied, "I like Conchology best." In a letter to his Aunt Sarah dated February 26, 1855, he wrote, "If you pick up any shells while you are in Lowell I wish that you would keep them for me for I am taking a great interest in shells and have quite a collection to show you when you come." At that time he was 16 years old. He might have become a leader in that field if his interest had not shifted to other phases of zoology. Later, he did describe four new species of mollusks, but none of his major papers was devoted entirely to the group. It is interesting to note, nevertheless, that while a new interest soon developed which overshadowed all others and became the main theme of his professional life, his interest in shells was not totally neglected. His daughter recalls that on their trip abroad in 1899 her father "collected shells with boyish enthusiasm." Some people have thought that because his future colleague E. S. Morse at the Peabody Academy of Science was primarily interested in the mollusks, Packard relinquished the field to him while he himself developed the collections of insects. However, the change came long before that time.

The very next year (1856) his chief interest turned to the insects and there it remained predominantly for the rest of his life. He once told his daughter that he began his life interest in insects by reading in bed with his window open so that his lamp would attract the insects. His journal for 1856 contained a list of the insects of Massachusetts copied from T. W. Harris and a list of books on entomology. Descriptions and drawings of insects he collected were recorded voluminously, and almost every day reference was made to observations on insects and birds particularly. The details have not been preserved; only a few scraps remain. In a letter to his brother William he wrote, "The microscope is just the thing I wanted and is very convenient and I am very much obliged to you for it. Charles gives me the appellation of the 'bugger'." In another letter, "Osgood shot one (partridge) and I have got his skull and that of a woodpecker with which I can begin to study comparative anatomy." He returned to Bowdoin in 1876 to give a series of lectures on comparative anatomy.

New Year's of 1857 found Packard still pursuing his intense interest in nature. "This forenoon I drew in my drawing book, pictures of Invertebrate Animals, it is good practice, and I must make myself a good draughtsman in time. Father returned from

Boston, he brought us all some presents. I sent by him for Agassiz's *Lectures on Comparative Embryology,* a most valuable pamphlet for me. (In 1876 Packard published a book entitled *Life Histories of Animals, including Man, or Outlines of Comparative Embryology.*) And, Aunt Lawrence sent me Siebold's *Comparative Anatomy of Invertebrate Animals,* a most valuable and instructive work which I have long wanted and will be of great use to me. . . . January 2, I intend only to note down in my diary occasional days but when the spring opens I shall keep a registry of periodical phenomena of animal and vegetable life. (His interest in seasonal relations of nature persisted over a long period of time and ultimately resulted in the publication in the *American Naturalist* of a series of articles each one of which was devoted to the insects predominant during a certain month of the year). . . . I have been reading Swanson's *Natural Arrangement of Insects.* (Six years later Packard proposed a new classification of insects which was widely adopted.) I sent yesterday for William Stimpson's *Shells of New England.* . . . I intend next summer to do a good deal of dissecting and shall devote myself much more to collecting insects etc. and dredging etc. Last summer I only collected about two hundred insects when I ought to have collected three times the number and I must give more attention to learning caterpillars. I intend next summer to have a fresh and salt water aquarium. This is the only way to study the habits and economy of animals. I must also use my microscope more. . . . February 6, Today I received from the Smithsonian *Microscopical Observations in Georgia, South Carolina,* etc. and *Catalogue of North American Serpents* which I wrote for. I wish that I had a good microscope to examine insects and infusoria etc., with. I have only a $3.75 one which Charles (sic) gave me a few years ago. . . . I wish I had a few hundred dollars to buy books with and a $1,000 microscope. I should 'be made' then, but I must work along as I can for the present and do what I can with my own microscope. . . . I also received blank schedules from the Smithsonian Institution concerning the periodical phenomena of animal and vegetable life which I intend to fill out and return at the end of the year. . . . March 4, I am now occupying my spare time in copying the article *Myriapoda* from Todd's *Cyclopedia of Anatomy.* I intend next summer to dissect invertebrates and make myself as familiar as possible with the internal as well as the external structure of these animals. The works of Leidy, Jones, and Siebold and Dr. Carpenter's new work on the microscope have given me a stimulus. . . . March 23, I have been reading Humboldt's *Heirs of Nature.* They have interested me very much and given me a new desire to travel."

"March 31, I am now engaged in studying and finding the names of my insects of which I collected between 200–300 last year. It is very difficult with what books I have." Later, Packard was to publish his popular guides to the study of entomology: *How to Observe and Collect Insects* (1862); *A Guide to the Study of Insects* (1869); *Directions for Collecting and Preserving Insects, Prepared for the Use of the Smithsonian Institution* (1873); *Our Common Insects* (1873); *Half-Hours with Insects* (1877); *Entomology for Beginners* (1888); *A Textbook of Entomology* (1898).

"April 1, This morning our garden was full almost of the snow bunting and the song sparrow. I shot one and though it did not exactly agree with Audubon's figure and description, it may have its feathers different. I shall shoot several more in the course of the summer and compare them. . . . April 5, I received from the Appletons (his mother's family) the first six numbers of Staniton's *Manual of British Butterflies and Moths.* I shall take it." Packard's publications on insects included many devoted to the butterflies and moths. His monographs on moths are regarded as his geratest contributions to entomology. Some of his titles are *On the Geographical Distribution of the Moths of Colorado* (1874); *A Monograph of the Geometrid Moths or Phalaenidae of the United States* (1876); *On a New Classification of the Lepidoptera* (1895); *On the Phylogeny of the Lepidoptera* (1895); *A Monograph of the Bombycine Moths of America, North of Mexico* (1896, 1905, 1914). During his career he described over 40 genera and more than three hundred species of moths and butterflies.

"April 23, 1857, William and I have today put up two martin boxes which I hope will meet their wants. They have not yet appeared as a northeast wind has been prevailing for a week past and accompanying cold weather." From this time on he entered in his journal each day climatic records obtained from Prof. Cleaveland and observations of the seasonal succession of plants and animals. The influence of climate on animal life later became the subject of a number of his studies. . . . "May 12, Have made considerable progress in ascertaining the names of my insects. It is a most interesting and delightful study to me, tho I want more works on entomology. I am now copying out Harris' contribution to entomology in *The New England Farmer.* . . . May 15, Received from the Smithsonian some filtering paper. I am going to send them on specimens of microscopic organisms. . . . I shall send the papers back to the Smithsonian after filtering water from various localities, 8 or 10. I shall have to do it once a month. They have sent me some of their publications and I hope to remunerate them in this way. . . . May 27, Spent most of the day in the Boston Society of Natural History. It has given me a new impulse to give more attention to geology." He became a life-long co-operator with the Smithsonian Institution and in 1865 he became acting custodian and librarian for the Boston Society of Natural History.

On June 2 he was operated upon to correct a cleft palate before he entered college. His condition had caused much suffering and the two operations, accomplished without anesthetic, were very painful but successful. Neither his infirmity nor the operations were mentioned by Packard in those parts of his journal which have been preserved. Continuing with July 8 he wrote, "Found much to my joy in Boston Society Drurey's *Illustrations.* Took it out and shall draw all the figures of North American insects. . . . July 10, Been in Boston Society naming my seaweeds. . . . July 26, Dr. Storer took me to the meetings of the Boston Society of Natural History where I saw many of the naturalists I have read so much about. My enthusiasm for the science is wrought up to the highest pitch, but I shall not have much time or money for it now. . . . July 29, I am studying now hard for examinations to enter college." He passed his entrance examinations "very creditably" according to a letter his father wrote to brother William, who was then studying at Goettingen. Later, Alpheus wrote to William, "August 23, I read a good deal about alpine regions while at Mrs. Bigelow's (where he stayed in Boston preparing and recuperating from his operations) and I can almost follow you in my mind. . . . I frequently worked over a herbarium of alpine flowers which Mrs. B. brought home. I have now an excellent idea of the alpine flora.

"August 28, I have commenced a course of geological reading. I shall read the elements of the science, then the particular surveys of different states etc., hoping merely to gain as good a knowledge of geology as I can without a teacher. . . . My interest was greatly excited by seeing the specimens of fossils etc., in Boston. . . . Have finished Hitchcock's *Geology* and shall now take up Lyell's elements (*Elements of Geology*). . . . September 8, I have now got out of the library Hitchcock's *Geology of the Globe.* I am going to copy off the two maps and hang them up near my cabinet, so that I can have them constantly before me. . . . I am now very much interested in geology, and in these past few days have got many new ideas about it. It does not look so difficult and formidable as before. I shall hope during this fall and winter to acquire as good knowledge as can be got from books of the science so that next year I can make a geological map of the vicinity of Brunswick. (In 1882 he published for beginning students a guide to the study of geology entitled, *First Lessons in Geology*). . . . September 28, I have copied the map of Brunswick from the one of Cumberland Co. and hope this fall to have most of the rocks put down pretty accurately. I shall take the rough sketch of the town with me whenever I go to ride, and note down the various rocks. It will be very useful exercise for me; give me practice in geological observations. . . . October 15, What little time I have I read geology, because I must have a good knowledge of it to improve my next summer's vacation, for I am going to walk somewhere with Bill Tucker mineralizing and geologizing." Packard retained a lifelong interest in geology—especially in mountains and glaciers. His interest in these features led to such published studies as the following: *Observations on the Glacial Phenomena of Labrador and Maine* etc. (1867); *Ice-marks and Ancient Glaciers in the White Mountains* (1867); *Glacial Marks on the Pacific and Atlantic Coasts Compared* (1877); *Glacial Marks in Labrador* (1882); *Notes on the Physical Geography of Labrador* (1887); *On the Crater of Mt. Shasta* (1896).

"Prof. Cleaveland is very kind and he also lets me go up in the Medical Library, where the sight of some rare and costly works on entomology greeted my eyes. He lets me take them out whenever I want to." Young Packard was very fortunate in receiving helpful encouragement from his father's colleagues on the Bowdoin faculty. The accessibility of the libraries, the stimulation received from faculty members, and the intellectual atmosphere of his home and community provided him a rich background for the development of his native abilities.

(*To be concluded in the October issue*)

THREE NEW UROPODINID MITES TAKEN WITH RATS IN PUERTO RICO[1]

By Irving Fox,[2] San Juan, P. R.

The mites of the Cohors Uropodina described below were taken during rat ectoparasite surveys made in connection with studies on murine typhus fever. That they have any epidemiological significance is not likely, but their association with rats makes it eminently desirable that they be provided with names. Five other species were previously described having been taken under similar circumstances (Fox, 1948) and undoubtedly more will be found in the course of these investigations. Types of these new species are in the entomological collection of the Department of Microbiology, School of Medicine, School of Tropical Medicine, San Juan, Puerto Rico.

Trachyuropoda borinqueni n. sp.
(Figure 1, A–E)

Female.—Length, 908μ, width 667μ. Body oval with conspicuous shoulders and a projecting vertex, posteriorly broadly rounded, lateral margins not smooth. Dorsal plate (Fig. 1, E) with the protusions characteristic of the genus, particularly two expanded portions, a longer anterior one and a shorter posterior one, between is a deep furrow containing a ridge-like structure on each side. Trägårdh (1952) in his description of *T. elegantula* states that these peculiar structures are made up of "about 12 pairs of leaf-shaped bristles which almost meet in the middle," but in the specimen here described, if the structures do indeed consist of such bristles, they are so closely appressed as to lose their individuality and appear to meet in the middle. Four rows of tubercles present on the protusions, but the middle two are more pronounced than the outer ones, and tubercles are also dense on the posterior margin. Vertex and lateral margins markedly sculptured, but without the dense row of setae that characterize *T. elegantula*.

Ventrum with lacunae on each side anterior and posterior to the genital plate and also between legs I and II as well as legs III and IV. Tritosternum (Figure 1, B) with the lacinia trifurcate, the outer branches with a fringe of fine hairs on one side and each of the three branches bifurcate distally. Movable digit of chelicera

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[2] Department of Microbiology, School of Medicine, School of Tropical Medicine, University of Puerto Rico, San Juan, P. R.

(Figure 1, C) with one rounded tooth distally. Genital plate more or less triangular anteriorly reaching well beyond coxae I and posteriorly to about the anterior third of coxae IV, its anterior portion bearing a row of 8–10 irregular spines diminishing in size

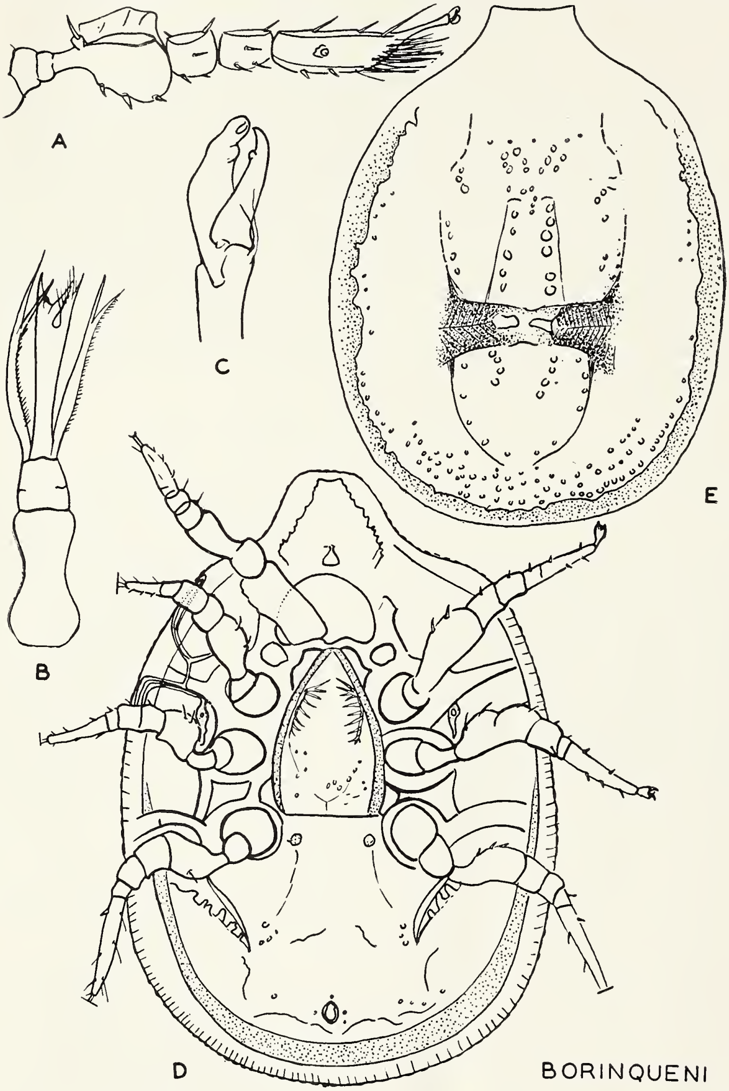


Fig. 1.—*Trachyuropoda borinqueni* female. A. Leg I. B. Tritosternum. C. Chelicera. D. Ventrum. E. Dorsal plate.

on each side (Figure 1, D). Stigmata on a level with the posterior borders of coxae II. Peritreme with the poststigmatic branch reaching to about the middle of coxae III; anteriorly it follows a course apparently similar to that of *T. elegantula* although in several places it is very difficult to discern, being most visible posterior to femur II where it is more or less in the shape of an inverted Y. Posterior to coxae IV the ventrum has a prominent groove on each side whose posterior border possesses a row of 3–5 tooth-like projections, but there are no further rows of these tooth-like projections as in *T. elegantula.* Anal pore small without associated setae, in fact there appear to be no setae at all in this area. Legs in nature undoubtedly provided with claws and caruncles, although in this specimen some of them have been broken off. Femora with prominent spine-like setae anteriorly; tarsi rather long and slender, also with setae. Squama of femur I as shown in Figure 1, A.

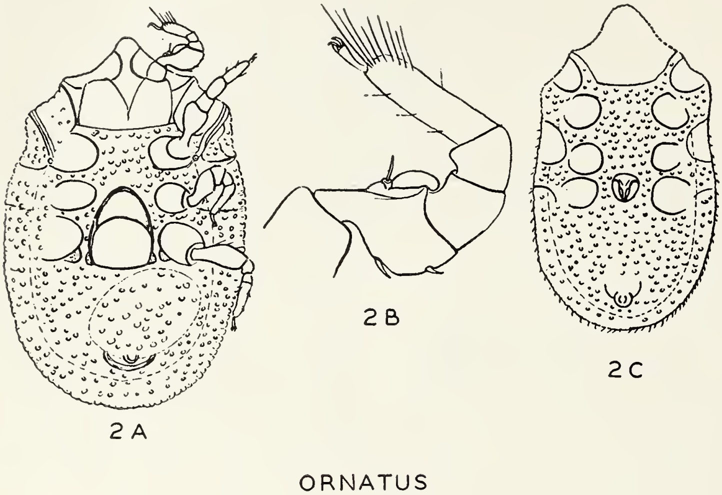
Type material.—Described from the female holotype taken at San Juan (Santurce), Puerto Rico, March 27, 1957 together with *Rattus norvegicus* in a wooden box-type trap.

Phyllodynchus ornatus n. sp.
(Figure 2, A–C)

Female.—Length 575μ, width 391μ. Body oval, rather flat, with prominent shoulders and a projecting vertex which is more or less pointed, lateral margins markedly crenulate. Dorsal plate single, oval, densely ornamented with large pits. Ventrum (Figure 2, A) entirely covered with these pits as well, being similar in this respect to *P. septentrionalis* Trägårdh (1943). Genital plate more or less rounded anteriorly, reaching almost to the anterior border of coxae III, posteriorly extending beyond coxae IV, its posterior corners with irregular but prominent extensions, and unlike *P. septentrionalis,* it is divided at the anterior third. Stigmata and peritremes difficult to discern, the latter most visible lateral of coxae II. Anal pore obscure and small. The entire ventral side is without setae. Legs small, provided with claws and caruncles. Squama of femur I (Figure 2, B) smoothly rounded preceded by a seta inserted in a prominent tubercle.

Male.—Length, 494μ, width 276μ. Body more slender than in the female, ornamented with densely distributed pits, the lateral margins provided with small curved setae (Fig. 2, C). Genital pore somewhat heart-shaped, located between coxae IV. Sternal plate without the setae that characterize *P. septentrionalis.*

Type material.—Described from the female holotype captured with *Rattus norvegicus* in a wooden box-type trap at San Juan


2 A
2 B
2 C
ORNATUS

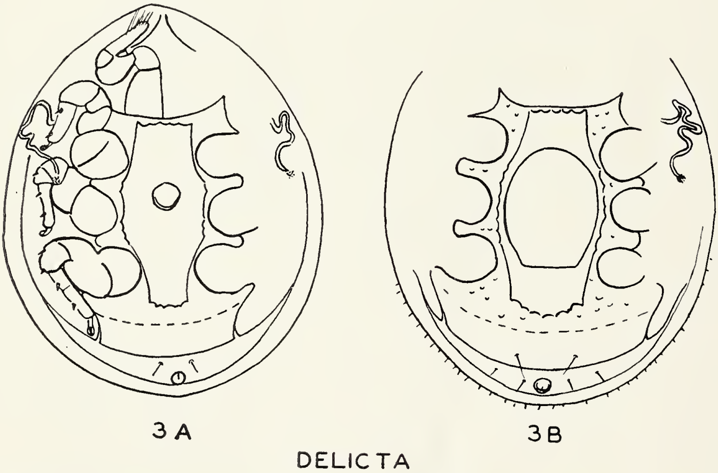

3 A
3 B
DELICTA

Fig. 2.—*Phyllodynchus ornatus.* A. Female, ventral side. B. Leg I of female. C. Male, ventral side. Fig. 3.—*Oplitis delicta.* A. Male, ventral side. B. Female, ventral side.

(Santurce), Puerto Rico on June 1, 1955 and the male allotype captured with *Rattus rattus* at San Juan (La Perla), Puerto Rico, April 6, 1957.

Oplitis delicta n. sp.

(Figure 3, A, B)

Female.—Length, 460μ, width, 391μ. Body oval, rounded posteriorly, lateral margins smooth at least ventrally. Dorsal plate divided posteriorly into two sections, the latter of which bears two or three rows of setae; the marginal plate dorsally is sculptured and provided with minute regularly placed setae. Ventrum (Figure 3, B) divided posteriorly. Genital plate rounded anteriorly, reaching beyond the posterior borders of coxae II and posteriorly to about the middle of coxae IV, surrounded by the curiously etched perigenital scutum characteristic of the genus, which resembles but differs in details that of *O. minutissima* (Berlese) as redescribed by him in 1903. Stigmata between coxae II and III. Peritreme without a poststigmatic branch, most visible near coxa II where it pursues a highly convoluted course. Ventrum ornamented with faint pits particularly apparent posterior to the genital plate. Anal pore moderate in size, flanked by a pair of setae on each side. Legs providede with claws and caruncles, tarsi tapering, with prominent setae.

Male.—Length 414μ, width 322μ. Similar in shape to the female. Dorsal and marginal plates as in the female. Genital pore (Figure 3, A) between coxae II and III with a perigenital scutum similar to that of the female. Ornamental pits not prominent. Anal pore not conspicuous, much smaller than the genital pore. Tarsi with stout spine-like setae.

Type material.—Described from the female holotype and the male allotype taken with *Rattus rattus* in a wooden box-type trap at San Juan (Puerta de Tierra), Puerto Rico on June 21, 1954.

LITERATURE CITED

Berlese, A. 1903. Illustrazione iconographica degli acari mirmecofili. Redia 1: 299–474.

Fox, I. 1948. New Uropodinid mites associated with rats in Puerto Rico. Ent. News 59: 169–174.

Trägårdh, I. 1943. Zur kenntnis der Prodinychidae (Acarina) Arkiv for Zool. 34 A: 1–29.

———— 1952. Acarina, collected by the Mangarevan expedition to South Eastern Polynesia in 1934 by the Bernice P. Bishop Museum, Honolulu, Hawaii, Mesostigmata. Arkiv for Zool. (Ser. 2) 4: 45–90.

A REDESCRIPTION OF THE FLEA GENUS LIBYASTUS JORDAN, 1936, WITH THE DESCRIPTION OF A NEW SPECIES (CERATOPHYLLIDAE: CERATOPHYLLINAE).

By Phyllis T. Johnson,[1] Washington, D. C.

The genus *Libyastus* Jordan contains ten described species whose normal hosts are African tree squirrels of the genera *Paraxerus, Heliosciurus, Aethosciurus* and *Funisciurus. Libyastus* is most closely allied to the holarctic genus *Tarsopsylla* Wagner, 1927, which also infests tree squirrels. Comparison of a new species of *Libyastus* in the United States National Museum collections (described later in this paper) with material from the Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts, and the British Museum (Natural History) makes possible a more detailed generic description than that originally given by Dr. Jordan, a description of the type of aedeagus found in *Libyastus,* and short redescriptions of females of the species forming Jordan's (1936) "Section A," an artitrary subdivision of the genus *Libyastus.*

I am grateful to W. L. Brown, Jr., of the Museum of Comparative Zoology, for lending specimens and checking certain collection data for me. F. G. A. M. Smit, of the British Museum (Natural History), again has my sincere thanks for lending specimens, studying species not available to me, reviewing the manuscript, and otherwise giving much of his time and valuable advice.

Libyastus Jordan, 1936

Libyastus Jordan, 1936, Novit. Zool., 40: 89. Type by original designation: *Ceratophyllus infestus* Rothschild, 1908.

Description.—*Head* (fig. 1): Small clypeal tubercle present. Preantennal area with 2 rows of bristles, the first of 1–3 bristles (sometimes these are missing and only a few hairs remain), and the ocular row of 3 bristles, middle one the smallest. Occiput with vertical preapical row, and with or without a median bristle above antennal groove, and with minute hairs scattered along entire length of the groove. Male with very short bristles apically on pedicel of antenna, female usually with at least 1 of these bristles reaching half distance of clava. Female clava notably long, two times as

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[1] Entomology Research Branch, Agricultural Research Service, United States Department of Agriculture.

long as broad and not expanded in the middle. Labial palpi reaching to about apex of procoxa, rarely a little beyond. *Thorax* (fig. 8): Pleural arch missing (as in *Tarsopsylla*). Lateral metanotal area (L.M.) usually lacking bristles except one small one in *notabilis* (Jordan, 1925) and in occasional abnormal specimens in other species. *Legs:* Profemur, externally, with 0–6 lateral bristles, internally with 0–3 lateral bristles. First (basal) pair and third pair of plantar bristles on segment V of all tarsi shifted a little on to the plantar surface. Male lacking the long, thin lateral bristles on all first tarsal segments which are present in *Tarsopsylla.* Metatarsal segment I not quite as long as segments II–IV inclusive. Metatibia with 8 dorsal notches including apical notch. *Abdomen:* Basal abdominal sternum always with 1 or more lateral bristles in female, usually with at least 1 bristle in male. One or two subdorsal marginal spinelets on each side of terga I–V (occasionally I–IV) in the male and on terga I–IV in the female. *Male:* With 2 antesensilial bristles, upper one the shorter. Eighth tergum lacking the mesal, dorsal spiculose area found in *Tarsopsylla,* and eighth sternum almost lost, reduced to a semimembranous connection between the seventh and ninth sterna (as in *Nosopsyllus*). Fixed process of clasper not especially prominent, with 1 or 2 acetabular bristles. *Aedeagus* (fig. 7): Apodeme (AE.A.) long and rather narrow, proximal spur (P.S.) present and apical appendage (AP.A.) present or absent. Penis rods (P.R.) coiled. Median dorsal lobe (M.D.L.) heavily sclerotized dorsally; crochet (CR.) large, crochet peg (PEG) long. Sclerotized inner tube (S.I.T.) with heavy dorsal armature (A.I.T.), band of inner tube missing. *Female* (fig. 17): With 3 antesensilial bristles (in abnormal specimens there may be 2, 4 or 5). Posterior margin of seventh sternum with at least an indication of a sinus or otherwise modified. Eighth tergum on the inner surface with 3–5 short stout spiniform (genital) bristles mesally below anal segment. Spermatheca with cribriform area produced, forming a prominent cone or snout. Anal stylet (A.S.) with 1 apical and 1 long ventro-lateral bristles, plus 1 or 2 minute lateral hairs. Dorsal anal lobe with 1 very long subapical bristle per side; ventral anal lobe with many bristles, none curved or spiniform (though several may be stout) and 2 very long subapical bristles on each side.

Dr. Jordan has divided the species of *Libyastus* into two sections. Section A is characterized by having the median occipital bristle reduced or absent, fixed process of clasper with a sinus in posterior margin, tergum VIII of male with a small ventromarginal lobe on the posterior margin, and female with the snout of the cribriform area of the spermatheca projecting outwards, not markedly directed ventrad. Section A includes *infestus* (Rothschild, 1908), *piger* (Jordan, 1925), *duratus* (Jordan, 1931), *selindae* de Meillon, 1940, a new species described below, and possibly *schoutedeni* Berteaux, 1947. Section B has a well-developed median occipital bristle, the fixed process of the clasper lacks a sinus in the posterior side, tergum VIII of the male lacks a small ventromarginal lobe on the posterior margin, and the female has the snout of the spermatheca distinctly projecting ventrad. Here belong *stratiotes* (Rothschild, 1905), *consobrinus* (Jordan, 1925), *notabilis* (Jordan, 1925), *vates* Jordan, 1936 and *hopkinsi* Jordan, 1943.

In the past, *selindae* and *duratus* had been treated as subspecies of *infestus*. Without comment Berteaux (1947, Rev. Zool. Bot. Africa, 40: 102) elevated them to full species. He was correct in doing so, since major genitalic and non-genitalic characters, including size differences, separate these species from each other and from *infestus*.

Libyastus smiti n. sp.
(figs. 1, 4, 8, 14, 15, 17)

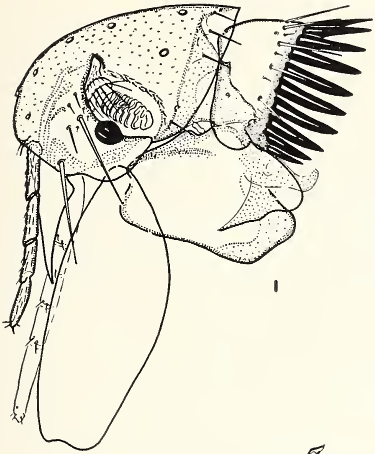
Type Data.—Holotype female, from *Aethosciurus byatti,* Tanganyika Territory; Nyange, Uluguru Mountains (south of Morogoro) 4 October 1926, A. Loveridge collector. Paratype female *ibid.* but Baglio, Uluguru Mountains, 22 September 1926. Holotype deposited in the collections of the United States National Museum, U.S.N.M. type No. 63515, paratype in the collections of British Museum (Natural History), Tring.

Diagnosis.—A member of Jordan's Section A. Separable from females of all other species in this section by the fact that the upper lobe of the posterior margin of the seventh sternum extends much farther posteriad than does the lower lobe (fig. 4) not with these lobes extending about the same distance, or lower lobe the longer. Closest to *infestus* and *selindae* in shape of the spermatheca. Bulga (body) of spermatheca about same length as hilla (tail), not obviously shorter as in *selindae* and *infestus* (compare figs. 4, 5, 6),

Explanation of Plate V

1. *Libyastus smiti:* head, holotype. 2 and 3. *L. duratus:* seventh sternum and spermatheca, paratype female. 4. *L. smiti:* seventh sternum and spermatheca, holotype. 5. *L. infestus:* seventh sternum and spermatheca, female. 6. *L. selindae:* seventh sternum and spermatheca, female. 7. *L. duratus:* aedeagus, male paratype.

BULL. B. E. S. VOL. LII PLATE V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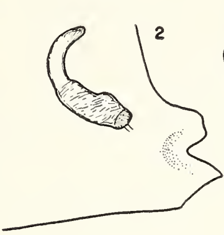
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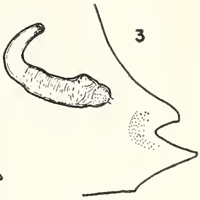
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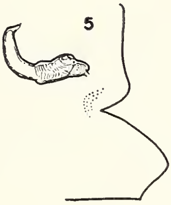
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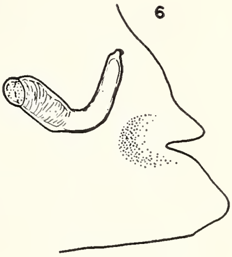
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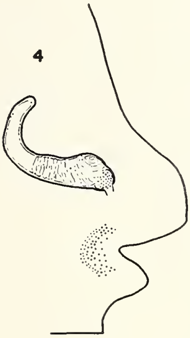
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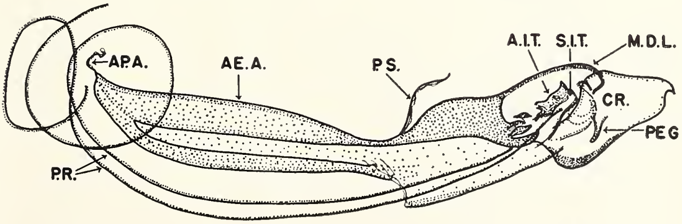
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and cribriform area joining bulga at about right angles to ventral margin of bulga. The two apical bristles of eighth tergum set closer together than in either *infestus* or *selindae, i.e., as* close as in *duratus.*

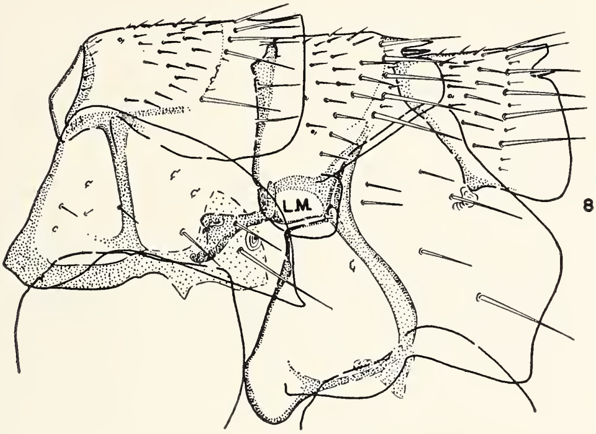
Description.—*Head* (fig. 1): First of two preantennal rows of bristles reduced to one or two short bristles near antennal groove plus a few hairs. Median occipital bristle missing. Remainder of head as normal for the genus. *Thorax* (fig. 8): As in other members of the genus. *Legs:* Profemur with 3 lateral external bristles in holotype, 5 in paratype, and with 1 lateral mesal (internal) bristle. *Abdomen:* Basal abdominal sternum with 12–15 (18–22 in paratype) lateral bristles on a side. *Modified segments* (fig. 17): Two known specimens each possess 3 antesensilial bristles. Above spiracle of tergum VIII, 19–20 small bristles on both sides together. Posterior margin of seventh sternum (fig. 4) with upper lobe large, obtuse, extending much farther posteriad than lower lobe; seventh sternum with about 15 lateral bristles on each side. Eighth tergum (fig. 15) with alveoli of two apical bristles almost touching in holotype, touching in paratype; the 3 or 4 mesal internal short spiniform (genital) bristles set in a row. Spermatheca (fig. 4) with hilla (tail) somewhat shorter than bulga (body), not noticeably humped dorsally; cribriform area joining bulga at approximately right angles to ventral margin of the latter. Anal stylet (fig. 14) of variable length, in holotype one side about 3½ times as long as broad, other side almost 4 times as long as broad, paratype with both sides more than 4 times as long as broad; stylet narrowing only slightly from base to apex.

Length.—Holotype, 4.2 mm.; paratype, 4.8 mm.

Explanation of Plate VI

8. *L. smiti:* meso- and metathorax, holotype.

9. *L. selindae:* apex of eighth tergum, paratype female. 10. *L. duratus:* apex of eighth tergum, paratype female. 11. *L. selindae:* anal stylet, paratype female. 12. *L. duratus:* anal stylet, paratype female. 13. *L. infestus:* anal stylet, female. 14. *L. smiti:* anal stylet, both sides, holotype. 15. *L. smiti:* apex of eighth tergum, holotype. 16. *L. infestus:* apex of eighth tergum, female. 17. *L. smiti:* modified segments, holotype. Drawings were taken from specimens as follows: *L. duratus:* paratype male and females from *Aethosciurus byatti,* Modehani. *L. infestus:* female from "squirrel or mouse," Meru. *L. selindae:* paratype female from Chirinda Forest, except the spermatheca drawing, which is from the Mt. Selindae paratype female.



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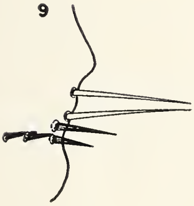

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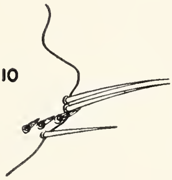

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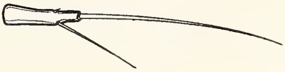

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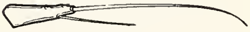

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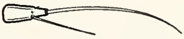

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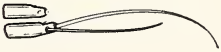

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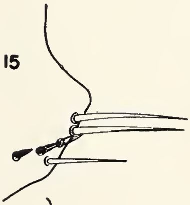

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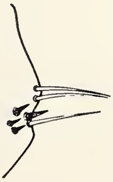

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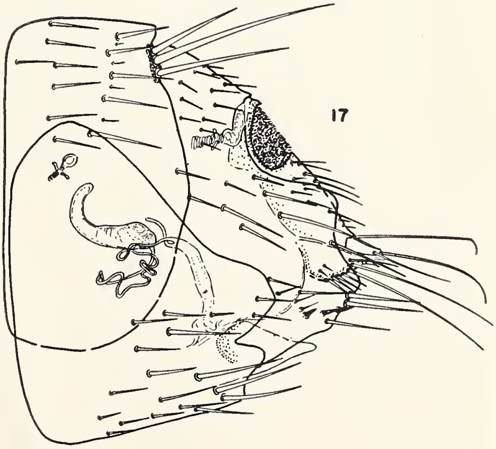

Libyastus duratus (Jordan, 1931)
(figs. 2, 3, 7, 10, 12)

Ceratophyllus infestus duratus Jordan, 1931, Novit. Zool., 37: 144, figs. 1–2.

Libyastus infestus duratus, Jordan, 1936, Novit. Zool., 40: 90. de Meillon, 1940, Proc. Roy. Ent. Soc. Lond. (Ser. B), 9: 146. Hopkins, 1947, Uganda Jour., Sci. Suppl., 11: 153, figs. 75, 83.

Libyastus duratus, Berteaux, 1947, Rev. Zool. Bot. Africa, 40: 102.

L. duratus was described from Tanganyika Territory, Modehani, Ukinga, off *Aethosciurus byatti* [*laetus*], Igale from *Heliosciurus spectabilis shirensis* and Rungwe Mt. from *Cricetomys gambianus viator,* all collected by A. Loveridge. There are in the collection of the Museum of Comparative Zoology the holotype male and three male, three female paratypes from *Aethosciurus byatti,* Modehani, one female paratype from *Cricetomys gambianus viator,* Rungwe Mt., and a fifth female bearing the data "from squirrel no. 2," Rungwe, Tang. Terr., Africa, 22-V-1929, R. Boulton collector. The remaining paratypes from the above-mentioned localities are to be found in the collections of the British Museum (Natural History).

This species is characterized in the female by the shape of the seventh sternum and spermatheca (fig. 2). Seventh sternum outline with upper lobe more narrowly rounded than in *infestus,* lower lobe usually sharply pointed and extending distinctly beyond upper lobe; seventh sternum with 10–16 lateral bristles on a side. The spermatheca with outline of cribriform area like a circle which is flattened on one side at juncture with bulga (body), line of juncture almost at right angles to ventral margin of bulga; a definite dorsal hump on bulga near cribriform area; hilla (tail) about same length as bulga (without cribriform area), not much narrowed except apical third. Anal stylet (fig. 12) 3½ to 4 times as long as broad basally, narrowing to apex. Two long apical bristles on eighth tergum with alveoli touching; the short mesal spiniform (genital) bristles number 3 or 4 and form a straight line (fig. 10).

A large species; females 4.3–4.8 mm., males 3.4–3.7 mm. Male and female profemur with 3–5 lateral bristles on external surface. No medial occipital bristle in either sex. Female with 10–14 lateral bristles on basal abdominal sternum, male with 2–8.

Libyastus infestus (Rothschild, 1908)
(figs. 5, 13, 16)

Ceratophyllus infestus Rothschild, 1908, *in* Sjöstedt, Kilimandjaro-Meru Exped., II: 4, pl. 1, figs. 6–9. Jordan and Rothschild, 1913, Novit. Zool., 20: 537, figs. 10–11. Jordan, 1925, Novit. Zool., 32: 105.

Ceratophyllus infestus infestus, Jordan, 1931, Novit. Zool., 37: 144.

Libyastus infestus infestus, Jordan, 1936, Novit. Zool., 40: 90. Hopkins, 1947, Uganda Jour., Sci. Suppl., 11: 153, figs. 74, 82.

Libyastus infestus duratus, Jordan, 1937, Novit. Zool., 40: 288 (*err. det.*).

Libyastus infestus, Berteaux, 1947, Rev. Zool. Bot. Africa, 40: 102.

L. infestus was described from *Funisciurus ganana* (misdetermination for *Paraxerus ochraceus* ssp., *fide* Hopkins, 1947), Kibonoto, Mount Kilimanjaro, Tanganyika, and has also been reported from *Heliosciurus keniae* from Mount Kenia, central Kenya by Jordan and Rothschild (1913). Three females in the Museum of Comparative Zoology from "squirrel or mouse" (probably from the squirrel), Mt. Mweru, Tanganyika Territory, 21 Aug. 1901, G. Allen collector, have proved to be this species. One of these three females was reported as *infestus duratus* by Jordan (1937). The "Mt. Mweru" referred to in this record is actually Meru, Kenya (not Tanganyika), on the Equator at about 36°30′ E. (Information received from W. A. Brown, Jr., who consulted with J. Bequaert and A. Loveridge, both of whom are familiar with Allen's collecting localities in Africa). The "Meru" of Allen should not be confused with the "Mt. Meru" which is the twin of Mt. Kilimanjaro in Kenya, an area where Allen never collected. Three females and one male from *Paraxerus jacksoni capitis,* Nairobi, Kenya, 29 Sept. 1920, W. N. van Someren collector, from the British Museum collections have also been examined.

Infestus females may be separated from other members of Section A by the shape of the posterior margin of the seventh sternum (fig. 5) which has the upper lobe broadly rounded, the sinus small and triangulate and the lower lobe also more broadly rounded than in *duratus* and extending well beyond the upper lobe. There are about 15–20 lateral bristles on each side of the seventh sternum. The spermatheca as in fig. 5; cribriform area not semicircular, juncture with bulga (body) is oblique; bulga humped dorsally just before the cribriform area; hilla (tail) about as long as bulga and gradually narrowing to apex, which has a sclerotized papilla. Anal stylet about 3 times as long as broad basally, narrowing to apex (fig. 13). Eighth tergum with alveoli of the two long apical bristles not touching, and mesal (genital) bristles consisting of 2 large and 2 smaller bristles, not forming a straight line (fig. 16).

A smaller species than most members of Section A; female 3.0–5.0 mm., male 2.8–3.5 mm. Male and female with profemur lacking lateral external bristles. Median occiput bristle absent in female, a small one may be present in male. Basal abdominal sternum with 10–13 lateral bristles in female, 3–5 in male.

Libyastus piger (Jordan, 1925)

Ceratophyllus piger Jordan, 1925, Novit. Zool., 32: 105, figs. 21–22.
Libyastus piger, Jordan, 1936, Novit. Zool., 40: 90. Hopkins, 1947, Uganda Jour., Sci. Suppl., 11: 153, figs. 77, 81.

Libyastus piger is known only from the types; one male and one female found on *Funisciurus* species, Uganda, Mabira Forest.

This species differs from the other members of Section A in several particulars. Although generally it is not so hirsute a form as the other species of this group, it has a fairly well developed median occipital bristle in both sexes. The female is easily separable from other Section A females by the shape of the seventh sternum, both upper and lower lobes being very broadly rounded, the lower projecting farther posteriad, and the sinus is a long shallow concavity. Laterally, both sides together, the seventh sternum bears only 14 bristles, the other species having about 24 bristles. Cribriform area of spermatheca small, juncture with bulga (body) at an angle of about 120° to ventral margin of bulga, no dorsal hump on bulga; hilla (tail) shorter than bulga. Eighth tergum much as in *infestus,* with mesal small spiniform (genital) bristles not set in a row, but with apical bristles set very widely apart. Anal stylet only about 2 times as long as wide.

A small species; male 2.8 mm., female 3.1 mm. In both sexes the profemur lacks external lateral bristles, and the basal abdominal sternum has only a few lateral bristles.

Libyastus selindae de Meillon, 1940
(figs. 6, 9, 11)

Libyastus infestus selindae de Meillon, 1940, Proc. Roy. Ent. Soc. Lond., Ser. B, 9: 146, figs. 3–4.
Libyatsus selindae, Berteaux, 1947, Rev. Zool. Bot. Africa, 40: 102.

Selindae was described from two males, one female off *Paraxerus palliatus swinnertoni,* Mt. Selindae, South Rhodesia, and one male, two females from a squirrel, Chirinda Forest, South Rhodesia. The following paratypes in the British Museum (Natural History) have been examined: one male, one female from Mt. Selindae and one female from Chirinda Forest.

The female of *selindae* may be distinguished by having the seventh sternum outline (fig. 6) with the upper lobe narrowly rounded, much as in *duratus,* but with the lower lobe broadly rounded, not so acutely as in *duratus.* Laterally the seventh sternum bears about 24 bristles on a side. Hilla (tail) of spermatheca longer than bulga (body), minus the cribriform area (fig. 6), cribriform area much as in *infestus,* joined to bulga obliquely, and hilla with apical papilla-like sclerotization as in *infestus.* Anal stylet (fig. 11) 3¼ to 3½ times as long as broad, not markedly narrowed from base to apex, lateral bristle set well back from apex, as in *duratus.* Eighth tergum (fig. 9) with 3–4 small mesal spiniform (genital) bristles set in a straight line (one female with triangulate pattern on one side); the two apical bristles set some distance apart. With three antesensilial bristles.

A fairly large species; male 3.2–3.8 mm., female 4.2–4.8 mm. Both sexes with a small median occipital bristle; basal abdominal sternum with 7–15 lateral bristles in female and 2–4 in male examined. Both sexes lacking lateral external bristles on profemur and with but 1 mesal lateral internal bristle.

CHANGE IN EDITORSHIP OF THE BULLETIN

Effective with this issue, Dr. John F. Hanson of the University of Massachusetts has assumed the editorship of the **Bulletin.** All manuscripts and communications pertaining to manuscripts, short articles and notes should be addressed to

Dr. John F. Hanson
Fernald Hall
Amherst, Massachusetts
University of Massachusetts

THE STATUS OF THE GENERIC NAME OF THE GRASS AND GRAIN JOINT-WORMS (HYMENOPTERA, EURYTOMIDAE).

By A. B. Gahan, College Park, Maryland.

Genus HARMOLITA Motschulsky

Isosoma Walker, Ent. Mag. I, p. 13, 1832. (Not Billberg 1820.)
Harmolita Motschulsky, Bul. Soc. Imp. Nat. Moscou, 36, Pt. 2, p. 58, 1863.
Philachyra Walker, Notes on Chalcid., Pt. 1, p. 7, 1871.
Isosomocharis Ashmead, Ent. Amer., 4, pp. 42, 43, 1888; Trans. Amer. Ent. Soc., 21, p. 331, 1894.
Xanthosoma Ashmead, Ent. Amer., 4, pp. 42, 43, 1888; Trans. Amer. Ent. Soc., 21, p. 320, 1894.
Isosoma Walker, Howard, U. S. Dept. Agr., Div. Ent. Tech. Ser. 2, p. 7, 1896.
Harmolyta Dalla Torre, Cat. Hym., 5, p. 154, 1898.
Isosoma Walker, Ashmead, Mem. Carnegie Mus. I, No. 4, pp. 259, 376, 378, 1904.
Urios Girault, Jour. N. Y. Ent. Soc. 19, p. 175, 1911.
Harmolita Motschulsky, Phillips & Emery, Proc. U. S. Natl. Mus., 55, pp. 433–471, 1919.
Isthmosoma Hedicke, Archiv. f. Naturg., Jahrg. 86 A, H. 11, p. 165, 1921 (1920); Deutsch. Ent. Zeit. 1923, pp. 616–618.
Harmolita Motschulsky, Gahan, Proc. U. S. Natl. Mus., 61, Art. 24, p. 7, 1922; Proc. Ent. Soc. Wash., 26, p. 224, 1924.
Harmolita Motschulsky, Gahan & Fagan, U. S. Natl. Mus. Bul. 124, pp. 69, 76, 1923.
Harmolita Motschulsky, Phillips, U. S. Dept. Agr. Tech. Bul. 518, pp. 1–26, 1936.
Harmolita Motschulsky, Peck *in* Muesebeck et al., U. S. Dept. Agr. Monog. 2, p. 568, 1951.

Ashmead, in his Classification of the Chalcid Flies, apparently was first to record the fact that *Isosoma* Walk. and *Harmolita* Mots. were the same. He failed to note that *Isosoma* Walk. was preoccupied. Phillips and Emery called attention to the preoccupation and used the name *Harmolita* instead of *Isosoma* in a revision of the North American species of the genus. In a revision of the European species in 1921, Hedicke recognized the preoccupation of *Isosoma* but declined to accept *Harmolita* as a substitute name and proposed the new name *Isthmosoma* instead. In 1923, Hedicke discussed the systematic position of *Harmolita* and reiterated his belief that it belonged in Pteromalidae where Motschulsky had placed it and that it could not be the same as *Isosoma.* A short paper by Gahan in 1924 dealing with the same subject contended that the description and figure of *Harmolita* by Motschulsky agreed with a male of *Isosoma* Walk. and reaffirmed the use of this name in place of *Isosoma.* Phillips' second revision of the species (1936) again used *Harmolita* as the generic name. Notwithstanding the fact that *Harmolita* has been quite generally accepted as the proper name for this group of grass and grain joint worms (having been used by Waterston, Ferrière, Tshesnokov, Balachowsky, James, Mani, Muesebeck, Ishii, and others) at least a few individuals still are using the generic name *Isthmosoma* for these insects, e.g. Shinji (Galls and Gall Insects, Tokyo, 1944, p. 428); Wahlgren (Ent. Tidskr. A. 65, h. 3–4, p. 97, 1944); and Van Leeuwen (Ent. Ber. XIII, p. 23, 1950).

Since this genus of insects is economically important, it is desirable that the matter of its proper name be clearly established if possible. It is with this object in view that the following observations are added to what has previously been said regarding the identity of Motschulsky's genus *Harmolita.*

In 1927, it was my privilege to visit several of the large European museums. The late Dr. James Waterston and I had had considerable correspondence relative to *Harmolita* prior to my departure for Europe. Upon my arrival at the British Museum, I was very pleased to learn that, through the good offices of Dr. B. P. Uvarov, Waterston had received from Moscow the type specimen of *Harmolita longicornis* Motschulsky, the genotype species. This specimen, together with others of Motschulsky's types, had been located in an attic at Moscow University. The specimen was mounted on a card and was in good condition except for the loss of one wing. It bore the name on a handwritten label and the locality label "Ceylon." It agreed in every respect with the original figure and description and there could be no doubt of its authenticity as the actual type specimen.

Waterston and I were agreed that this specimen was a typical male of the genus *Isosoma* Walker. Dr. Waterston intended to prepare and publish a redescription of this type, but because of declining health which finally culminated in his untimely death in 1930, he was not able to do so. Knowing Waterston's intention to publish a redescription, I made no detailed notes on the type. However, there is no longer any doubt that *Harmolita* Motschulsky and *Isosoma* Walker are the same genus and that *Harmolita* instead of *Isthmosoma* is the name that should be applied to the group of grass and grain joint-worms.

THE GLOSSARY OF ENTOMOLOGY

In the twenty years which have elapsed since the appearance of the **Glossary,** many new terms have been added to and some old terms have been discarded from the entomological vocabulary. Several workers have suggested that a supplement to the **Glossary** consisting only of new terms would be timely and of special value to younger entomologists.

Although the Society has no immediate plans for the revision of the **Glossary,** it would undertake the preparation of a supplement if a substantial interest is manifest by those working in entomology. This notice serves as an invitation for entomologists everywhere to submit terms and definitions for inclusion in such a supplement. It would be helpful if contributors would submit their suggestions on 3 × 5 library cards, typewritten if possible, and include bibliographic references as well. Modified or additional definitions for terms presently found in the **Glossary** also are solicited at this time. All communications should be sent to the Publication Committee in care of George S. Tulloch, 22 East Garfield Street, Merrick, N. Y.

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WANTED—Larvae of *Anthrenus scrophulariae* preserved in alcohol.—EDITOR.

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The Brooklyn Entomological Society

Meetings are held on the second Wednesday of each month from October to May, inclusive, at the Engineers' Club, 117 Remsen Street, Brooklyn 2, N. Y. The annual dues are $2.00.

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. LII OCTOBER, 1957 No. 4

TWO NEW SPECIES OF BANASA FROM CENTRAL AMERICA (HEMIPTERA: PENTATOMIDAE).

By Reece I. Sailer,[1] Washington, D. C.

The following species are described in order to make the names available for use in a paper concerned with cytological research now being prepared by Drs. Franz and Sally Schrader of Columbia University. The genus *Banasa* currently includes 25 named species; however, at least 50 species are represented in the U. S. National Museum collection. Obviously a thorough revision of the genus is needed.

Banasa schraderi n. sp.

Related to *bidens* Van Duzee, 1934, being almost indistinguishable in color, shape and size; however, the dorsal surface and particularly the head are somewhat less punctate. Characters of the male genitalia (see Figs. 2 and 9) readily distinguish the two species. Both species have the inner apical angle of the female genital plates lunately excavated. This character associates both *bidens* and *schraderi* with the *subrufescens* (Walker, 1867) species group.

Color and surface sculpture.—Head and pronotum back to a line between the humeral angles stramineous, tinted with pale green. Remainder of pronotum and scutellum pale green except tip of latter which is pale or almost white. Head almost smooth, fuscous punctures concentrated around and before the ocelli leaving a raised smooth quadrate area on frons which bears a few punctures along either side of the middle line. Fuscous punctures, sparsely and regularly distributed over all but apex of scutellum and over pronotum, an impressed row along anterior margin of latter. Cor-

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[1] Entomology Research Division, Agricultural Research Service, U.S.D.A.

NOV 20 1957

ium with raised, smooth, stramineous areas, discal area tinted with castaneous, an over-all variegated effect produced by dark castaneous punctures. Propleura coarsely punctate, meso- and metapleura obscurely so; venter smooth.

Antenna pale green or yellowish, apical two-thirds of segments IV and V each infuscated. Legs and venter stramineous, tinted with pale green. Apical half of each claw, tip of rostrum and acute posterolateral angle of each abdominal segment black. Tergum dark castaneous, connexiva stramineous.

Structure.—Ovate, pronotum and basal two-thirds of scutellum convex in lateral view. Head with juga sinuate before the eyes and regularly rounded to apex of tylus. Rostrum barely exceeding the hind coxae, ratio of segments as 4:6:5:4. Ratio of antennal segments as 20:30:50:65:63. Venter of abdomen with basal spine scarcely acute, barely reaching apices of hind coxae. Male genital structures as shown by Figures 5, 8 and 9. Female genitalia as shown by Fig. 3.

Length, including membrane: Male, 9.5 mm.; female, 9.8 mm.

Width across humeral angles: Male, 5.2 mm.; female, 5.6 mm.

Type material.—Holotype: ♂, Turrialba, Costa Rica, May 31, 1944, Franz Schrader #360, U. S. National Museum cat. No. 63401. Allotype: ♀, same dat. Paratypes: 1 ♂, same data; 1 ♂, Turrialba, C. R., F. Schrader #CR. 49F25; 1 ♂, Turrialba, C. R., Schild-Burgdorf collection.

Banasa panamensis n. sp.

This species has a superficial resemblance to *bidens* and other members of the *subrufescens* group, however, the structures of the male, and to a lesser degree the female, genitalia are quite different. In fact the differences exhibited are of such a character as to suggest that *panamensis* may be subgenerically distinct from the other described members of *Banasa*. It is the only species known to me in which the inner lateral margins of the pygofer cup each bear a long, curved, mesally directed spine (see Fig. 7).

Color and surface sculpture.—Head and pronotum back to a line between the humeral angles stramineous, lateral margins tending to be narrowly edged with reddish brown. Eyes and ocelli reddish. Antenna pale reddish brown, paler on first segment and on basal third and apex of fifth. Remainder of pronotum and scutellum, translucent pale brown to olivaceous. Hemelytra similarly colored except for the somewhat lighter embolium. Apex of the scutellum smooth and pale yellow or stramineous. Head and anterior part of the pronotum with scattered rufescent punctures. Similar punctures more numerous and evenly distributed behind a line between the humeral angles, on the scutellum except the apex, and on the hemelytra. Membrane hyaline tinted with brown. Tergum rufescent, connexiva paler with the acute process at posterior lateral angle of each segment rufescent to castaneous. Propleura and area on posterolateral angle of metapleura coarsely punctate. Venter smooth, shining, pale yellow tinted with green. Legs pale, with a rufescent tint. Apical half of each tarsal claw and the apex of the rostrum black.

Structure.—Elongate oval. Dorsal and ventral surface about equally convex, anterior lobe of pronotum slightly declivent. Head concave before the eyes and gradually narrowed to round apex. Juga attaining apex of tylus. Rostrum attaining or even reaching beyond the posterior margin of abdominal segment III, ratio of segments as 4:6:8:6. Ratio of antennal segments as 25:33:60:-72:70. Propleura and area on posterolateral angle of metapleura coarsely punctate. Venter of abdomen with basal spine reduced to a rounded protuberance. Male genital structures as shown by Figures 1, 6, 7, and 10. Female genitalia as shown by Figure 4, with disk of each genital plate convex, the mesal margin depressed and tinted with brown.

Length, including membrane: Male, 12.0 mm.; female, 12.3 mm.

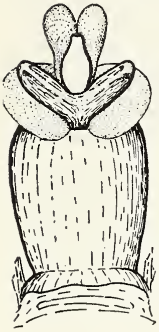
Width across humeral angles: Male, 6.0 mm.; female, 6.1 mm.

Type material.—Holotype: ♂, Barro Colorado, June 16, 1956, F. Schrader #A33, U. S. National Museum Type cat. No. 63402. Allotype. ♀, same data. Paratypes: 1 ♀, same data. 1 ♂, same locality, September–October, 1940, Jas. Zetek, at Light. 1 ♂, same locality, September–October, 1941, Jas. Zetek. 2 ♀♀, Trinidad Rio, Panama, March 20, 1912, A. Busck. 1 ♂, Porto Bello, April 21, 1912, A. Busck.

Explanation of Plate

Fig. 1, *Banasa panamensis,* dorsal view of aedeagus, with conjunctival appendages distended. Fig. 2, *B. bidens,* median caudal view of left paramere. Fig 3, *B. schraderi,* ventral view of female genitalia. Fig. 4, *B. panamensis,* ventral view of genitalia. Fig. 5, *B. schraderi,* dorsocaudal view of male pygofer, with left paramere removed. Fig. 6, *B. panamensis,* median caudal view of left paramere. Fig. 7, *B. panamensis,* dorsocaudal view of male pygofer with left paramere removed. Fig. 8, *B. schraderi,* ventral view of male pygofer. Fig. 9, *B. schraderi,* median caudal view of left paramere. Fig. 10, *B. panamensis,* ventral view of male pygofer.

BULL. B. E. S. VOL. LII PLATE VII



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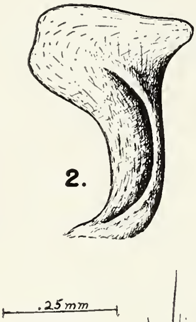

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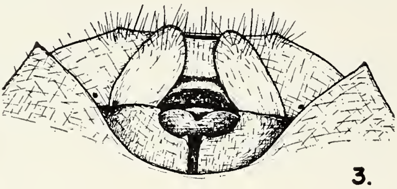

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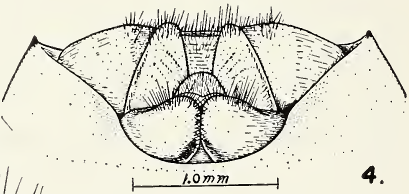

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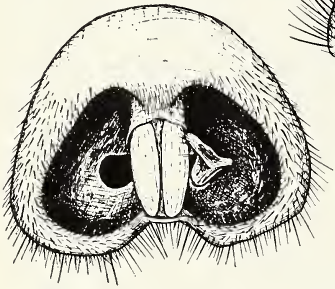

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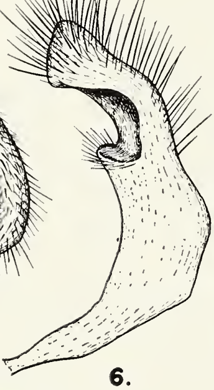

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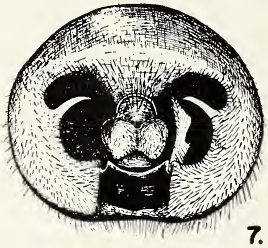

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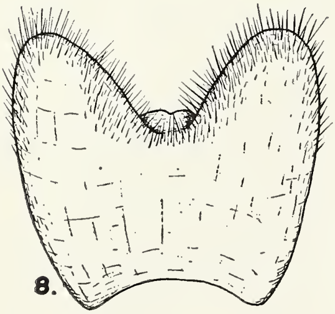

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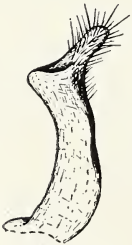

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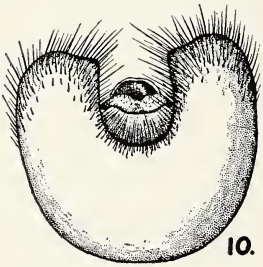

10.

NOTES ON COLOR AND PATTERN OF EYE IN DIPTERA. II.[1]

By George C. Steyskal, Grosse Ile, Michigan.

The following notes continue those previously published on flies of the families Stratiomyidae, Aulacigastridae, and Otitidae. An example of the taxonomic indications to be found in the eye pattern will be seen below in the resemblance in the patterns between *Odinia boletina* and *Traginops irrorata,* the latter long considered to belong to the Agromyzidae. Specific distinctions in the Stratiomyidae will doubtless become of increasing value as data accumulates.

All material was killed in chloroform vapor and captured in southern Michigan, unless otherwise indicated.

BRACHYCERA ORTHORRHAPHA

Dolichopodidae

Hydrophorus agalma Wheeler, ♂♀. Eye plain olive-green.

H. amplectens Aldrich, ♂♀. Eye olive-green with small, indistinctly delimited, dorsal area of purple.

H. chrysologus Walker, ♂ (Fig. 1). Eye brownish green with a purple dorsal area and a purple antedorsal band separated by a green area.

Plagioneurus univittatus Loew, ♂♀ (Fig. 2). Eye green, becoming coppery dorsally and with a small area of indigo at ventral edge.

Empididae

Leptopeza compta Coq., ♀. Eye plain deep purple.

Rhamphomyia longicauda Loew, ♂♀. Eye plain dark olive-green.

Erinnidae

Solva pallipes Loew, ♂♀. Eyes plain greenish black.

Xylomyia americana Wied., ♂. Eyes plain dark olive-green.

Rhagionidae

Chrysopilus quadratus Say, ♂♀. Eye in female plain olive-green, in male with enlarged dorsal ommatidia dark brown, the lower smaller ommatidia olive-green.

Rhagio vertebratus Say, ♀. Eye olive-green with purplish cast, especially anteriorly.

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[1] For Paper I see this Bulletin, vol. 44 (5): 163–164 (1949).

Omphralidae (Scenopinidae)

Omphrale fenestralis L., ♂♀ (Fig. 3). Eye very dark olive with mid-longitudinal stripe of deep purple.

Stratiomyidae

Actina viridis Say, ♀. Eye plain dark olive-green.

Berkshiria albistylum Jns., ♂ (Fig. 4). Rather different from female (v. Paper I, p. 163, fig. 1A); brownish green in ground color with green horizontal band edged broadly with purple and with isolated purple clouds in upper and lower parts, the cloud in lower part quite faint.

Eulalia (= *Odontomyia*) *cincta* Oliv., ♀ (Fig. 5). Eye brownish olive in ground color, with horizontal band of reddish purple edged with blue.

E. pilimana Loew, ♂♀ (Figs. 6, 7). In male as in Figure 6, ground color olive-green, with horizontal band of bluish purple edged with reddish; in female as in *E. virgo* (*v. i.*, figure 7).

E. virgo Wied., ♀ (Fig. 7). Ground color olive-green, with purplish tinge dorsally and posteroventrally; horizontal band bluish purple edged with reddish.

Eupachygaster punctifer Malloch, ♂ (Fig. 8). Eye green in ground color with purple vertical fasciae as shown. The fasciae are not edged with a different color as in *E. henshawi* (*v.* Paper I, p. 163, Fig. 1B).

Euparyphus tetraspilus Loew, ♀ (Fig. 9). Eye olive-green in ground color, with purple glint ventrally. Two wide horizontal bands are green, broadly edged with red.

Hedriodiscus vertebratus Say (*Odontomyia*), ♀ (Fig. 10). Eye olive-green in ground color, with purplish brown horizontal band and with large anterodorsal spot of dark brownish olive broadly edged with indigo.

Ptecticus sackeni Will., ♂♀. Eye plain bright green with coppery reflections.

P. trivittatus Say, ♂♀. Eye plain green with bronzy to bluish reflections anteriorly.

Sargus elegans Loew, ♂♀. Eye plain green.

Stratiomys badius Wlk., ♀ (Fig. 11). Eye bluish black in ground color, with two wedge-shaped marks, broadest anteriorly, of bronzy olive-green edged with blue.

S. meigenii Wied., ♂♀ (Figs. 12, 13). Eye in female (Fig. 12) deep indigo in ground color, almost black dorsally and ventrally, with two horizontal bands, not reaching occipital margin, of golden green edged with blue; in male (Fig. 13) the ground color is olive-green with one horizontal band and the lowermost part dark indigo.

S. norma Wied., ♀ (Fig. 14). Eye dark purple in ground color, with two horizontal bands of olive-green edged with blue.

ACALYPTRATAE

Agromyzidae

Cerodonta dorsalis Loew, ♂♀. Eyes plain rich purple.

Chamaemyiidae

Chamaemyia juncorum Fallén (*polystigma* Mg.), ♀. Eye plain reddish purple with green reflections.

Plunomia flavicornis Malloch and *P. transversa* Malloch, ♂♀. Eye plain olive-green.

Chloropidae

Ceratobarys eulophus Loew, ♂♀, Florida. Eye plain reddish purple.

Ectecephala sulcata Sabrosky, ♂♀. Eye plain olive-green.

Clusiidae

Clusia lateralis Wlk., ♀. Eye plain reddish brown with greenish overcast.

Clusiodes melanostoma Loew, ♀. Eye brown with greenish overcast.

Heteromeringia nitida Jns., ♂♀. Eye plain dark purple with greenish reflections on anterior enlarged ommatidia.

Sobarocephala flava Mel. and Argo, ♀, and *S. flaviseta* Jns., ♂♀. Eye plain brownish purple to purplish red.

Diastatidae

Diastata repleta Wlk., ♂. Eye plain bluish purple with green reflections.

Drosophilidae

Stegana coleoptrata Scop., ♀ (Fig. 15). Eye dull purplish red in ground color, becoming maroon at each side of a moderately wide horizontal band of bluish violet.

Ephydridae

Hyadina furva Cresson (*Lytogaster*), ♀ (Fig. 16). Eye purple in dorsal one-third, green in ventral two-thirds.

Hydrellia griseola Fallén, var. *obscuriceps* Loew, ♀ (Fig. 17). Eye green dorsally and posteriorly, most of ventral part purple.

H. griseola Fallén, var. *scapularis* Loew, ♂♀. Eye olive-green to coppery grading to bright green on lower front side.

Helomyzidae

Amoebaleria defessa O.S., ♀. Eye plain dull brownish green.

Suillia quinquepunctata Say, ♂♀. Eye reddish brown with greenish overcast.

Lauxaniidae

Homoneura citreifrons Malloch, ♂. Eye bright green, a little bronzy reddish dorsally.

Minettia ordinaria Melander, ♀. Eye dark green, becoming purplish at edges.

Sapromyza browni Shewell, ♂. Eye plain dark brown with green reflections.

Milichiidae

Milichiella populi Steyskal, ♂. Eye plain dull brownish red with greenish reflections.

Pholeomyia indecora Loew, ♀. Eye plain dark brown with greenish overcast.

Odiniidae

Odinia boletina Zett., ♀ (Fig. 18). Eye brownish purple with greenish tinge, becoming plain green at each side of a horizontal purple band.

Traginops irrorata Coq., ♀ (Fig. 19). Eye with two horizontal bands of green, the upper one the broader; between and dorsad of the bands, purple; ventrad of the bands, blue.

Otitidae

Callopistromyia annulipes Macq., ♂♀. Eye plain olive-green.

Delphinia picta Fabr., ♀ (Fig. 20). Eye olive-green ventrally, a little above middle sharply becoming purple, then gradually shading dorsally into olive suffused with purple.

Herina ruficeps v.d.W., ♀. Eye plain dark olive-green.

Pterocalla strigula Loew, ♂♀. Eye plain brownish with greenish reflection.

Eumetopiella rufipes Macq., ♂. Eye plain dark red.

Euxesta pechumani Curran, ♀. Eye plain reddish purple with greenish glint.

Seioptera vibrans L., ♂♀. Eye plain dull red with greenish reflection.

Piophilidae

Piophila foveolata Mg. (*nigriceps* Mg.), ♂. Eye plain dark green.

P. latipes Mg., ♂♀. Eye plain dark red-brown with greenish cast.

Psilidae

Chyliza apicalis Loew, ♂♀. Similar to *C. notata* (*v.i.*), but the ground color wholly brownish green and the indistinctly delimited stripe bluish green.

C. notata Loew, ♂♀ (Fig. 21). Eye in ground color brownish green below, more brownish toward occiput, or even reddish in male, dorsally reddish brown, across middle of eye with indistinctly delimited horizontal band of plain green, broadening anteriorly.

Pseudopsila collaris Loew, ♀. Eye plain reddish purple.

Loxocera cylindrica Say, ♂♀. Eye plain dark red.

Tanypezidae

Tanypeza luteipennis Dyar and Knab, ♀. Eye plain dark red.

Tylidae

Rainieria antennaepes Say, ♀. Eye plain dark red.

Taeniaptera trivittata Macq., ♂♀, Florida (Fig. 22). Eye green in ground color, dorsally with dark purple markings as figured.

Trypetidae

Euaresta bella Loew, ♂♀. Eye bright metallic yellow-green.

Eutreta sparsa Wied., ♂ (Fig. 23). Eye in ground color reddish purple with a tinge of golden green at dorsal and ventral extremities and crossed by three complete horizontal bands of golden green.

Neaspilota alba Loew, ♂♀. Eye plain golden green.

N. albidipennis Loew and *N. vernoniae* Loew, ♂♀. Eye plain metallic green when viewed obliquely, with strong coppery sheen when viewed perpendicularly to surface.

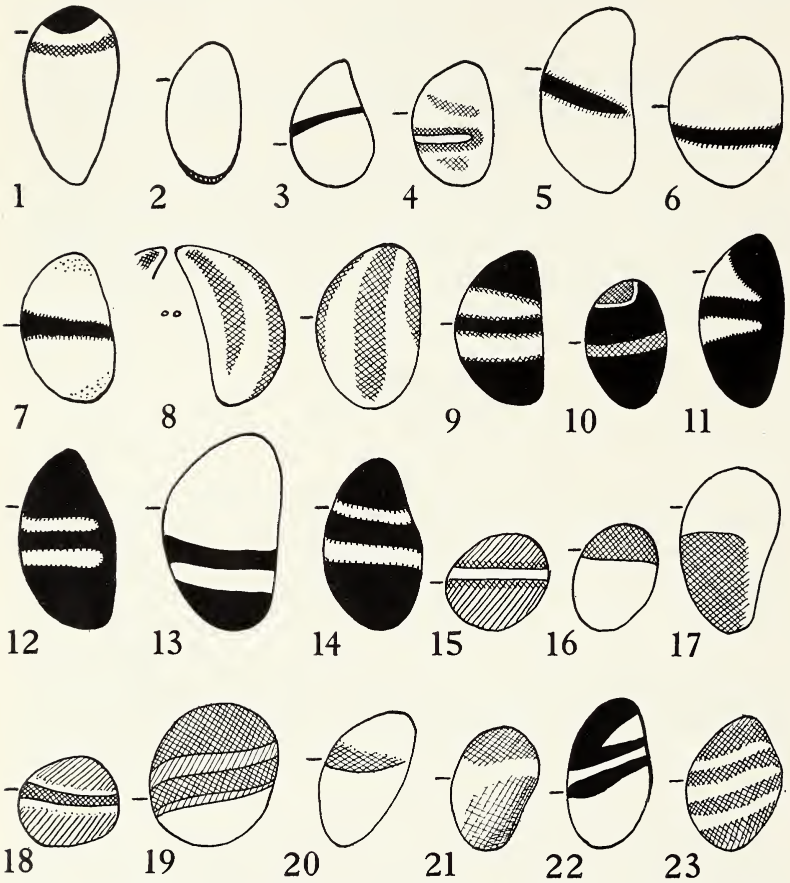
Orellia palposa Loew, ♂. Eye plain golden green.

Procecidochares atra Loew, ♀. Eye with three vertical fasciae of approximately equal width and also a partial stripe occupying anterior angle of eye. The posterior or first stripe is purple with a bluish glint, the second is green and tapers to lower and upper margins of eye, the third is much like the first but more reddish and with less blue reflection, and the anterior area is green, which color also invades the anterior edge of the third fascia in tiny spots.

Rhagoletis tabellaria Fitch, ♂♀. Eye plain bright green with coppery and bluish reflections.

Tomoplagia obliqua Say, ♀. Eye plain bright green with some coppery reflection.

BULL. B. E. S. VOL. LII PLATE VIII



Eye Patterns of Freshly Killed Diptera. Profile of left eye, with point of attachment of antennae indicated by dash. Fig. 1. *Hydrophorus chrysologus* Wlk., ♂; 2. *Plagioneurus univittatus* Lw., ♂♀; 3. *Omphrale fenestralis* L., ♂♀; 4. *Berkshiria albistylum* Jns., ♂; 5. *Eulalia cincta* Oliv., ♀; 6. *E. pilimana* Lw., ♂; 7. *E. virgo* Wd., ♀; 8. *Eupachygaster punctifer* Mall., ♂, anterior and profile views; 9. *Euparyphus tetraspilus* Lw., ♀; 10. *Hedriodiscus vertebratus* Say, ♀; 11. *Stratiomys badius* Wlk., ♀; 12. *S. meigenii* Wd., ♀; 13. *idem,* ♂; 14. *S. norma* Wd., ♀; 15. *Stegana coleoptrata* Scop., ♀; 16. *Hyadina furva* Cr., ♀; 17. *Hydrellia griseola* Flln., var. *obscuriceps* Lw., ♀; 18. *Odinia boletina* Zett., ♀; 19. *Traginops irrorata* Coq., ♀; 20. *Delphinia picta* F., ♀; 21. *Chyliza notat* Lw., ♂♀; 22. *Taeniaptera trivittata* Macq., ♂♀; 23. *Eutreta sparsa* Wd., ♂.

A MODIFIED SWEEP-NET FOR SMALL INSECTS.

By George B. Riley, Columbus, Ohio

Collecting small insects with a standard sweep-net is often encumbered by the accumulation of plant debris and large, vigorous insects within the bag. Small specimens are not only subject to damage by larger individuals and herbage but are also obscured by this material. In the past, collcting thrips, leaf-hoppers, and other small to minute species has been tedious and time consuming. Large numbers of small insects can be obtained quickly and with relative ease by the use of the modified sweep-net apparatus shown in the accompanying figure.

A frame of the same size and configuration as the supporting rim of the net to be used is formed of heavy, stiff wire. Two recurved hooks of the same material are welded to the frame so that one hook will lie on either side of the net handle and reach behind and under the net rim. Three sigmoid clamps are welded to the frame at 90 degree intervals. Thus the recurved hooks grasp the net rim at the handle and the sigmoid clamps are forced over the net rim, holding the wire frame snugly against the net face. The stiff wire frame is covered with wire screen, the size of the mesh depending on the size of the species to be collected.

A much shallower net may be used with this screen than would be practical otherwise. A muslin bag 12 to 14 inches deep with non-tapered sides and a flat bottom has proven very acceptable. This short bag allows excellent illumination of the interior and the flat bottom affords a large area for inspecion. The bag tends to form a semi-flat bottomed cylinder when the handle is held horizontal. Specimens can be removed from this apparatus by swinging the screen out of the way and the ease and rapidity with which specimens can be removed permit few escapees. Use of the short bag allows rapid selection of specimens and obviates the necessity to "crawl inside the net." However, a standard or removable bottom net can be used with the screen if concentration of material is desired, as when cyanide killing jars are employed.

The jarring effect of the screen striking plants is greater than would be true of an open mouthed net. In the latter case the plant is struck only by the net rim, allowing flexion and resulting in a brushing or pushing aside of the herbage. On the other hand, the entire face of the screen acts as a barrier to plant movement, causes a shock to all the tissue encompassed by the net mouth, and results in the dislodgement of a much higher proportion of insects than is possible with an open net. This point has been substantiated by very satisfactory collections using the screen on plants immediately after open-net sweepings had yielded few specimens. Use of this screen does not result in appreciable damage, even to delicate species such as thrips and minute Diptera.

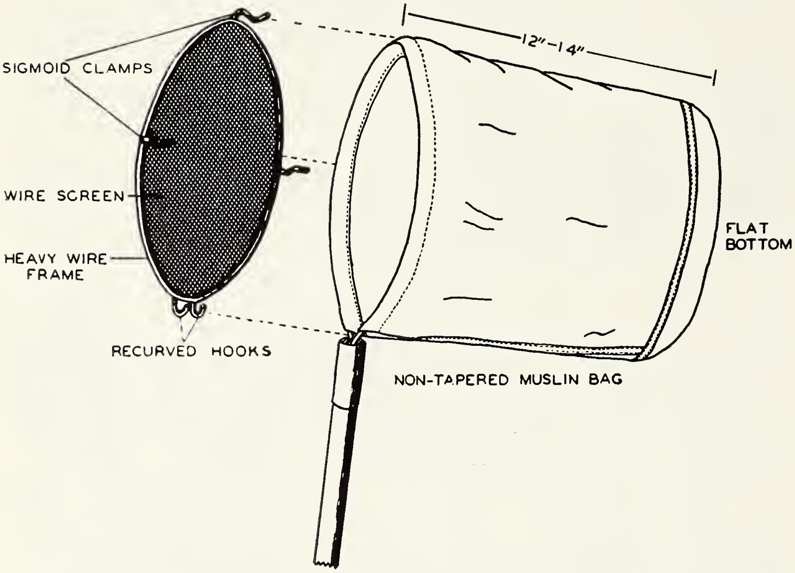


Fig. 1. Details of the modified sweep-net.

PRE-PUBLICATION NOTICE

Principles of Biological Control by Harvey L. Sweetman, the new revised and expanded edition, will appear in December 1957. It covers the broad field of biological control of plants and animals. It will acquaint the reader with life histories, habits, methods of handling, and methods for the control of insectan and other pests. It is designed to serve undergraduate and graduate students and research workers. Price about $8.50. Reserve your copy now. Wm. C. Brown Company Publishers, Dubuque, Iowa.

SEX IDENTIFICATION IN SOME LARVAE OF SCARABAEOIDEA.[1]

By James H. Menees,[2] Ithaca, N. Y.

Recent investigations have indicated the need for sex determination of immature insects. Toxicologists, for instance, find significant differences in the susceptibility of sexes to insecticides, and physiologists require a knowledge of the sex of immature insects for hormone studies. Entomologists in the past have sexed larvae indirectly according to secondary sex characteristics, such as the development of the external genital armature, and the appearance of the antennae. Little attention has been given to the external manifestation of internally developing reproductive structures. This paper deals with the latter and employs the method of sexing suggested by Hurpin (1953).

Herold (1815), in working on the internal reproductive organs of *Pieris brassicae,* noted in the larva two long threads extending posteriorly from kidney-shaped bodies to the ninth abdominal segment where they fastened to small, white swellings under the rectum. From Herold's description and drawings one may see that he described the testis, vasa deferentia and terminal ampullae. Hurpin, in a paper on the recognition of sex in larval Scarabaeidae described the terminal ampullae as being the "Organ of Herold," but Hurpin does not explain the anatomical significance of the ampullae.

In female embryos Johannsen & Butt (1941) say that ventral remnants from the coelomic sacs of the seventh abdominal somite form the ampullae. Snodgrass (1935) states that with the posterior extension of these ampullae and their ducts to the posterior ventral part of the eighth abdominal segment, the definitive opening of the median oviduct, is shifted from its primitive opening on the venter of the seventh abdominal segment to a location on the venter of the eighth abdominal segment.

In male embryos Johannsen & Butt say that the ampullae are formed from ventral remnants of the coelomic sacs of the tenth abdominal somite and that these ampullae are attached to the posterior ends of the vasa deferentia and persist as terminal parts of these ducts but later unite to form the anterior part of the defini-

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[1] I wish to acknowledge the assistance of the Grace H. Griswold Fund for assuming the expense of engraving the plate.

[2] Department of Entomology & Limnology, Cornell University.

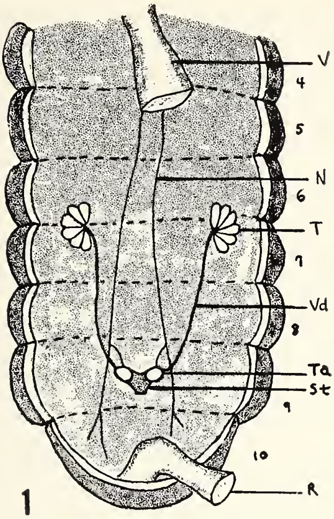
tive ejaculatory duct. Snodgrass (1941) explains that where the embryonic history of the vasa deferentia has been followed in connection with the development of the phallus the terminal ampullae of the ducts leave their primary points of attachment on the ventral ectoderm of the tenth abdominal segment, or in the appendage rudiments of this segment, and migrate mesally and anteriorly to the base of the tenth segment or into the posterior part of the ninth. Here a median ectodermal ingrowth is formed that unites with the ampullae and becomes the definitive ductus ejaculatorus.

In connection with a project on the morphology and histology of the scarabaeid larva of the European chafer, *Amphimallon majalis* (Razoumowski), it was noticed that sex could be determined in live larvae by using the method described by Hurpin. The integument is transparent in these larvae, making possible the direct observation of certain internally developing reproductive structures in males. Two ovoidal structures, the terminal ampullae (Figs. 1, 3, Ta), appear lying at an angle to each other in the ventral part of the ninth abdominal segment. These structures are embedded in a sclerotized triangular plate which is formed by an invagination from the body wall and marks the location of the definitive ejaculatory duct (Figs. 1, 3, St); the vasa deferentia (Vd) extend from the testis (T) in the sixth abdominal segment to the ampullae in the ninth segment (Fig. 1).

In order to see how early in development the ampullae of the male could be found, embryos of *Amphimallon majalis* were sectioned parasagittaly. In male embryos in which dorsal closure was complete the ampullae were found in the venter of the ninth abdominal segment and were associated with an invagination of the body wall from this segment.

In female larvae the ampullae lie in the posterior ventral part of the eighth abdominal segment (Fig. 2), but cannot be seen externally for a layer of adipose tissue lies between them and the integument (Fig. 4). From a dissection, the lateral oviducts (LO) are seen to extend from the ovaries (O) in the seventh abdominal segment to the ampullae (Ta) in the eighth segment.

Dissections on many larvae were done to determine sex by identification of the ovaries and testis alone, but the location of the terminal ampullae and the fact that these structures are visible through the integument of the male and not visible through the integument of the female definitely establishes a method of sexing these larvae without recourse to dissection.



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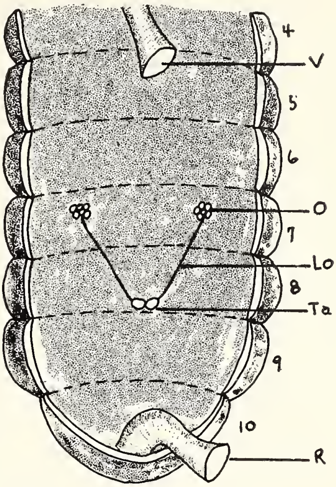

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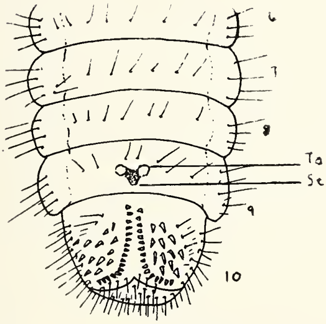
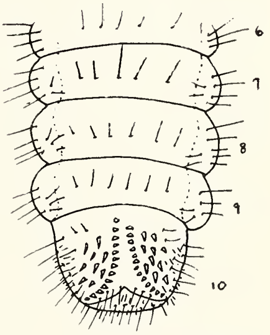


3 Male



4 Female

Explanation of text figures. Abbreviations: LO—lateral oviduct, N—10th abdominal nerve, O—ovaries, R—rectum, St—sclerotized triangle, T—testis, Ta—terminal ampullae, V—ventriculus, Vd—vasa deferentia. Fig. 1. Internal view of male larva showing ventral abdominal floor. Fig. 2. Internal view of female larva showing ventral abdominal floor. Fig. 3. External ventral view of male abdomen showing that ampullae are visible through integument. Fig. 4. External ventral view of female abdomen showing that terminal ampullae are not visible through integument.

The following species of Scarabaeoidea were sexed by the above method: Passalidae: *Popilius disjunctus;* Lucanidae: *Ceruchus piceus;* Scarabaeidae: *Xyloryctes blatchleyi, Autoserica castanea, Popillia japonica, Amphimallon majalis, Anomala orientalis, Pelidnota punctata, Osmoderma* species.

Data used for this method of sexing can be summarized best by the following table:

	FEATURE	MALE	FEMALE
1.	location of ampullae	on posterior ventral part of 9th abdominal segment	on posterior ventral part of 8th abdominal segment
2.	are ampullae visible through integument	*yes*	*no;* a layer of adipose tissue lies between ampullae and integument
3.	opening denoted by location of ampullae	definitive ejaculatory duct	definitive median oviduct
4.	ampullae formed from	coelomic sacs of 10th abdominal segment	coelomic sacs of 7th abdominal segment

LITERATURE CITED

Herold, M. J. O. 1815. Entwickelungsgeschichte der Schmetterlinge anatomisch und physiologisch bearbeitet. Cassel und Marburg.

Hurpin, B. 1953. Reconnaissance des sexes chez les larves de Coléoptéres. Scarabaeidae. Bull. de la Soc. Entomologique de France. Tome LVIII, No. 7. Paris. pp. 104–107. 1 plate.

Johannsen, O. A. & F. H. Butt. 1941. Embryology of insects and myriopods. McGraw-Hill. N. Y.

Snodgrass, R. E. 1935. Principles of insect morphology. McGraw-Hill. N. Y.

Snodgrass, R. E. 1941. The male genitalia of Hymenoptera. Smithson. Misc. Coll. Vol. 99, No. 14.

THE DEVELOPMENT OF A. S. PACKARD, JR. AS A NATURALIST AND AN ENTOMOLOGIST.

By Ralph W. Dexter,[1] Kent, Ohio

(*Continued from the June issue*)

In a letter dated October 14, 1857, Alpheus' father wrote, "Alphie has just completed a geological map of the U. S. Is hung up before him—and has obtained a curious insect from Texas through John Lincoln today—the prophet or praying insect (mantis). He rejoices in these treasures. He works well in his class studies. His leisure is occupied with interest unabated with his geology and natural history though his daily lessons take up most of his time. He has got a notion of getting a clerkship at Augusta this winter where he will have access to the library and cabinet."

Alpheus wrote to his brother William in Germany on December 9, "I have lately been reading a long and minute account of the eastern Alps and have been able to trace out your route and the geological features of the country and will be able to know all about the specimens that you got for me. . . . As soon as I know enough about entomology I am going to correspond with some English entomologist and thus make myself thoroughly acquainted with the science which is greatly neglected in this country." He became one of the founders of American entomology and was instrumental in training a great many others through his teaching and writing. It cannot be said that entomology was neglected following the time of Packard, partly through his influence on the rising generation of naturalists both professional and amateur. On December 23 that year he decided to give particular attention to the Lepidoptera (butterflies and moths), an interest which remained with him throughout life and became his principal field of investigation.

December 30, "I have been out in the woods getting mosses and lichens to send to two gentlemen who have studied them all their lives, to name them for me. Prof. Chadbourne (from Williams College who was giving a series of lectures on natural history at Bowdoin at this time) advised me to do this. I have been down to see him twice and I like him very much. He was up here to dinner and I showed him my cabinet and herbarium. . . . Prof. C. is going to exchange shells with me next summer. . . . He has also very kindly offered to send down to me a collection of grasses and sedges, named and put up by the only man in this country who knows about them and has studied them all his life, so that I can name whatever I find around here. It astonished me when he said he would do it. There you see the true spirit of science!"

The year 1858 was one of significant development for the young naturalist. His journal begins with January 2. "I received also a letter from Prof. Henry of the Smithsonian acknowledging the receipt of the registers and lists of Orthoptera and Reptiles of this town and they are going to send me Prof. Hitchcock's article on surface geology. . . . Yesterday I sent a letter to Mr. Scudder of Williamstown to commence corresponding with him in regard to entomology. (Samuel H. Scudder, student of Prof. Chadbourne, became an outstanding entomologist, specializing in the Orthoptera, and became a life-long and the favorite friend of Packard.) This forenoon I have been arranging my Orthoptera in a new drawer. (As secretary of the U. S. Entomological Commission 1877–1882, Packard investigated the outbreak of orthopterans—grasshoppers and locusts—in northwestern U. S. and published many reports on his field studies and observations. During his career he described three new species of Orthoptera.) I have finished the first part of Agassiz's work on Testudinata."

In a letter to brother William dated Jan. 26, 1858, he wrote, "I saw in the papers the other day that a man travelled over Britain, France, and Germany for $500 and said he could do the same now for half the money—is it so? If so, there are some hopes of my getting over there sometime. (In 1872 he travelled throughout Great Britain and Europe visiting all of the major museums there.) . . . March 20; I shall begin the campaign against insects etc., with renewed ardor. I think now I know how to collect animals better than before, insects certainly, while the hope of effecting exchanges will stimulate me still more." In another letter to William he wrote, "I wish you would keep a lookout for land and freshwater shells and fossils which I am particularly desirous of getting. As soon as I can get to writing German I shall exchange with some of those naturalists. I am studying insects a little so that I can make the most of my visit to Boston, which I am looking forward to with much eagerness. . . . April 16: Have received this week letters from Dr. Durkee in regard to Dr. Harris cabinet. He will let me visit the cabinet and library of the Society of Natural History as much as I please when I go up. I also received a letter from Mr. P. R. Uhler of Baltimore saying that he and Dr. Morris of that city would exchange insects with me and name them for me."

On Packard's trip to Salem in 1858 he visited the Athenean and the Essex Institute, from which the Peabody Academy of Science later evolved, Packard becoming one of the first curators. April 22, "Got introduced to Dr. Wheatland (leading organizer of the Institute and later the Academy Vice-president) and a Capt. King, a microscopist. Had a talk with him about microscopes, etc. Both gentlemen were very attentive and polite. . . . Dr. Wheatland showed me their collection of insects, a fine collection of Brazilian insects, a good many foreign, but few Mass. insects. Some 200 from England given them by Dr. Harris.—Went down to see Mr. True again carrying down with me some minerals I had brought up to exchange. He was very generous to me. . . . April 28: This morning Uncle Aiken gave me a magnificent present—27 vols. of *Silliman's Journal of Science.* A fine addition to my library.

"May 3, Came down to Boston this morning. This P. M. called on Dr. Storer, got a letter of introduction to Dr. Gould and a letter to Mr. Gillarrdy the librarian of the Boston Soc. Nat. Hist. by which I can take out books. He (Dr. Gould) named some shells which I brought up with me. I found that what I thought might be new species were not. . . . May 5: Called on Dr. Durkee, he was very polite, named my specimens of seaweeds for me and he showed me his collection of seaweeds and invited me to attend their meeting tonight. . . . Then went to the meeting of the Boston Society Nat. Hist. Saw many of the Boston savants. Heard Prof. Agassiz' remarks on his explorations in Florida. All exceedingly interesting to me." (This was the first time young Packard saw Agassiz, although his work was well known to Packard who later became a favorite pupil of the master naturalist and served as an assistant in his museum.) In a letter to his father Packard wrote, "Prof. Agassiz was very jolly, talking and laughing.

"May 6, I went to see Dr. Warren to see whether I could see his museum. He also gave me a letter of introduction to Prof. Wyman. . . . May 8: Been copying busily from Mr. Edwards and DeKay's *Fauna of the U. S.* . . . July 6: I received a letter yesterday from Dr. Clemens desiring me to correspond and exchange with him. He is devoting himself to the Heterocera (moths), right in my line. (Among the moths sent to Dr. Clemens that year was a new species which he named *Semioscopis packardella.*) July 7: My correspondence with Scudder still continues. I have within a few weeks since received a letter from Baron Osten Sacken, Secretary of the Russian Legation, desiring me to send him on specimens of Diptera, as he is preparing a work on those inhabiting this country." In a letter to William, Alpheus remarked that, "My name was given to him by Prof. Baird. You see how much that institution (Smithsonian) has helped me along and probably hundreds of others like me in this country. . . . July 15: Had a letter from Dr. LeConte stating that he would name my Coleoptera (beetles) for me, and also saying that he might possibly come on as far as Richmond, and if so would look over my collection. . . . Within a few days I have received another letter from Baron Osten Sacken telling me how to set Diptera, etc. . . . Charles took me to Damariscotta to see the oyster bank (Indian kitchen midden). They find live oysters they say of the same kind in the river nearby. My expectations were rather disappointed, it is not so large as I expected to see. . . . I carried away about a gallon of shells. . . . On my way over from Norwich to Damariscotta I counted 87 different species of plants by the roadside. . . . August 24: I have been reading up a good deal on Maine zoology and dreamt and thought about going down to Harpswell and working there for months past, to be so much disappointed after staying there four days, completely disheartened me and I didn't feel well. A naturalist must have perseverance and energy to attain to any success which I alas so much lack!" Packard was never in robust health in his youth. In spite of discouragement on this early excursion he maintained

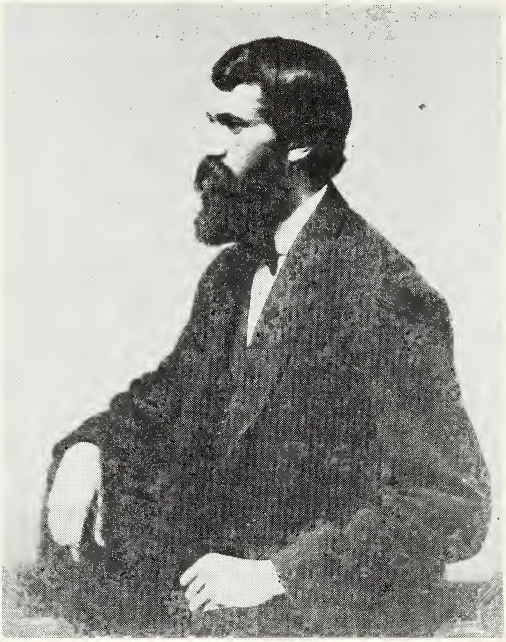


Fig. 1. Tintype portrait of A. S. Packard, Jr. taken about 1869.

an interest in marine life through the years. He later published several papers on the results of dredging studies he made along the coast and developed a special interest in marine insects. This was later extended to the insects of Great Salt Lake and other bodies of salt water on which he wrote a number of papers. Another marine interest which flourished through his professional career was the morphology and embryology of the King Crab or Horseshoe Crab.

September 25, "I am now getting ready my Coleoptera to send Dr. LeConte to name for me. I have 64 species the names of which I know and 340 species unknown, a little over 400 species of Coleoptera indigenous to Brunswick. . . . Oct. 19: I have spent most of my time in getting ready my moths for distribution. I have already got beyond 350 species and shall come very near I think 400 species of moths alone! . . . I have written to Mr. Gulich soliciting exchanges in shells. I am still briskly corresponding with Mr. Scudder who is now under Agassiz' instruction. How I envy him!

No date: "I received yesterday from P. N. Uhler a letter in regard to my Neuropera (nerve-winged insects), hurrying them up! I have been at work on them this afternoon. I have 166 specimens and shall send him all except a very few duplicates. . . . Nov. 16: I have been preparing my Diptera (two-winged flies) to send to Osten Sacken. I have taken within two seasons 475. . . . I can't conceive why I should be so unfortunate in all my attempts at constructing a salt-water aquarium. I have no trouble in a river aquarium. . . . Dec. 1: I wrote to William Stimpson at Washington some days since desiring to open a correspondence with him and asking him to name my specimens for me. Today I heard from him, he expressed his willingness to do both, at which I am much rejoiced. The idea of having my marine invertebrates named for me is enchanting! . . . Dec. 2: Worked about for two hours in the icy cold salt water at dead low tide, searching for marine animals with great good fortune for I brot home 3 species if not four of Doris (nudibranch mollusk), etc. . . . Dec. 4: This P.M. I received a letter from Baron Osten Sacken acknowledging the receipt of my Diptera I sent him a week since. He seemed much pleased with them and said there were some new ones among them. I was also pleased to receive from Mr. Stimpson of Washington some pamphlets. I think my correspondence with him will prove of the greatest interest and value to me. . . . Dec. 14: My insects etc. from Scudder came this afternoon. Everything perfectly safe with two books which he lends me. There were shells etc. Lepidoptera. Many shells new to me. Alcoholic specimens, many were new. A great many of the insects were new to me. A great surprise!"

The entries made in 1859 were few and brief, mentioning chiefly his field collections and observations and correspondence for exchanges. Some excerpts follow: "Went to call on Prof. Chadbourne (who was now on faculty at Bowdoin), he gave me some dozen land and fresh water shells new to my collection. . . . Book from Prof. Baird, wrote acknowledging it and offering to send on species of reptiles and eggs of birds. . . . Received a letter from William Stimpson who sent back my drawings. Also shells, a few he said were new. . . . Received a letter from Prof. Baird, he wants a cinereous owl and will name my batrachians (frogs). . . . Been over to see Prof. Chadbourne, had a talk with him in regard to a Natural History Society. . . . Prof. Chadbourne lectured tonight on "Natural History as related to the Intellect." The vestry was crowded with a very attentive audience. . . . Been naming my grasses. . . . It's a difficult study. . . . Feb. 19: Been at work on my Carices (sedges) hope to be more successful than in the grasses. My birthday, 20 years old. . . . Received a letter from Dr. True. Will exchange minerals for insects. . . . Got three juniors to join our Natural History Society. Makes 6 of them. . . . We had a meeting yesterday to organize. I was chairman of a committee to draft a constitution, etc. . . . Been getting ready some insects for Portland Nat. Hist. Soc. (E. S. Morse was the curator of this society until it was destroyed by fire. He then went to the Peabody Academy at Salem, Mass., and became a colleague of Packard.) . . . Making an index to my *Stimpson's Shells of New England*. . . . Letter from Stimpson, he wants me to join a dredging excursion next Aug. down our coast! A handsome offer. . . . It will be a great thing to be in his company for so long a time. . . . Entered on my duties as secretary of Cleaveland Nat. Hist. Soc. . . . Went down yesterday morning to the end of Goose Island to visit Morse of Portland who was at a camp of artists. . . . Morse gave me a good deal of information about the land and fresh water shells of Maine. . . . Went down the Bay to the Brown Cow. We had a fine day. Landed on the Brown Cow, found to my joy a great abundance of *Helix hortensis* (land snail found along northern Atlantic coast). . . . Rec. letter from Mr. Stimpson today telling me that he was unable to get up a party to go down East. It is a great disappointment to me. . . . Been trying to identify my Polyzoa (moss animals). Can only make out the genus. I've found the idea of making for my private use a *Manual of Marine*

Zoology like Gosse's, adapted to New England. It will be a good thing to me. . . . Rec. a letter from Dr. Morris. Wrote me that he could not write me the names of the insects I sent him as he had taken off the numbers and the rest were not moths, got no return for them, and not even named. It's perfectly discouraging! Shall have to work pretty hard this term helping to arrange our Nat. Hist. Soc. collections. . . . Been working today naming the shells in the cabinet of Cleaveland Nat. Hist. Soc. We had a letter from Nat. Hist. Soc. of Illinois desiring exchange of minerals, etc. . . . Wrote Illinois Soc. and Cyrus Thomas to exchange with me. (Packard was to become associated with Cyrus Thomas on the U. S. Entomological Commission between 1877–82.) . . . Commencing to study up and write an account of our Orthoptera. Wrote Dr. Wheatland of Salem to see if he would exchange the publications of Essex County Institute for 150 species of insects. . . . Been studying my Orthoptera today—think I've got some new species. They are not described by Harris. I shall name and describe them myself now and try to find out more about them when I go to Boston. . . . Been studying up on my Geometridae (measuring worm moths) this P. M. It is pleasant work. I begin to see now what is to be done in the way of studying up this family. I must attend to the pterology (structure of the wings) especially, and the anatomy of the organs of the head. Dr. Clemens remarks on this are a great help to me. . . . Went this morning with my insects to the Essex Institute. Found Dr. Wheatland, he gave me all the journals and Proc. of the Soc. Had a very pleasant talk with him and also with Mr. Russell and Dr. Wheatland, Jr.; in P. M. . . . Went out to Cambridge with Scudder. Was introduced to Agassiz and some of his pupils. Went over the New Museum building, saw some of their collections. . . . Nov. 29: Was introduced to Prof. Wyman. Went through his museum, got many new ideas!"

Dec. 13: "Am reading DeCandolle's *Geographie Botanique* and Müller on the Echinodermata larvae for French and German." It was characteristic of Packard to weave his interest in natural history into his other studies. January 19, 1860: "Spent all the forenoon arranging my Diptera and drawing. (He later described seven new species of Diptera.) Received this P. M. a diploma and letter informing me of my election as a corresponding member of the Boston Society of Natural History (his name had been proposed by Scudder). . . . Jan. 27: Received from Prof. Baird instructions about collecting birds' nests and eggs. Wrote him asking him if I could have the Smithsonian Institution's collection of

Geometrids for study. . . . Feb. 16: Commenced to write out in a connected form in a book my observations of our butterflies. . . . Feb. 22: Commenced to collect materials for a paper on Echinoderms to read at the next meeting of our Nat. Hist. Soc. . . . Mar. 26: Have been preparing an article for the *Maine Farmer.* Wrote the editor to see if he would pay me for a series of articles this year on entomology for farmers." His first publications were articles on economic entomology written for this periodical, and he became a contributor to this publication over a period of 45 years. At this time he conducted members of his class on a field trip to the Bay of Fundy, followed shortly by his first major expedition.

June 14, "Decided to go with Prof. Chadbourne to Labrador where he wishes me to collect with a companion. It will be rather rough hard work, not too good for my health. If I have pluck enough to stand up under it, I shall have a fine chance to study natural history. (The expedition was under the auspices of the Lyceum of Natural History at Williams College and under the direction of Prof. Chadbourne. Some 20 students, largely from Williams College, made up the scientific party. Some were to be left at Labrador for field research and the others were to go to Greenland. Packard stayed at Labrador with six others.) June 26: Took the evening stage to Thomaston, got there at 11 and went down to the *Nautilus* (schooner for trip to Labrador) and slept aboard with a dozen others. . . . July 3: Came up near Cape Ray this A. M. Tonight off Cape St. Georges. Sailed up to this time 660 miles; 250 miles to Caribou. (His headquarters were to be on Caribou Island.) Spent a few hours picking over sea weed. Took some 60 or 70 specimens. Good haul (taken with a dredge). The 4th. Had a celebration. Lay orator, Smith Poet, apple sauce for dinner. Have jolly times down in the cabin evenings. Gregory of N. J. makes great times for us. Good singing. . . . July 6: Hauled up *Astroph agassizii* (*Astrophyton agassizii,* a brittle star) in 60–70 ft. . . . July 11: Men putting up a shanty for us to put our specimens and stores in. Some can sleep there. Can't cook much yet. No proper stove, have to live pretty roughly for some days. . . . July 17: Hunted insects this forenoon. . . . July 18: Been to the shore collecting today and drawing and describing a species of medusa new to me. . . . July 21: Dredged some today, did pretty well. Got some new shells, worms, etc. Mosquitoes and flies awful. Hopkins shot a fox near our door, a white one. . . . July 23: Been shore collecting today. Got some good specimens of sponge and the sea peaches. Took some noctuids at evening. Mosquitoes horrible. . . . July

29: Mr. Carpenter had service on the island for the first time, some 50 present (a mission house was built on Caribou Island under Carpenter's direction. Packard and a companion attended regularly. Each suitable day Packard collected insects, some of which proved to be new species, and marine invertebrates he found along the shore or by dredging; also he dug for fossils.) Aug. 25: Our vessel hove in sight this P. M. about 4 o'clock and 7 or 8 came over a few hours after. . . . Sept. 3: Saw a Portuguese Man-of-War this A. M. First live one I've seen, beautiful object." It is very unusual to find this species so far north.

They returned to port on Sept. 11. Packard's expenses for the trip were $65.00 (total of $133.20 less $68.20 for services rendered). His experiences and scientific observations on this expedition have been published in his book *The Labrador Coast,* (1891), which includes his second visit to Labrador made at a later date. This volume was dedicated to the memory of Prof. Paul Chadbourne. Also, he published a number of reports on the zoology and ethnography of the region such as: *A list of animals dredged near Caribou Island, southern Labrador, during July and August 1860* (1863); *Observations on the glacial phenomena of Labrador and Maine, with a view of the recent invertebrate fauna of Labrador* (1867); *Life and nature in southern Labrador* (1885); *Notes on the Labrador Eskimo and their former range southward* (1885).

Sept. 25, "Wrote Dr. Wheatland to see whether they would purchase $25.00 worth of birds, marine invertebrates, etc. . . . Oct. 20: (In Portland) called on Hudson and Kimball, artists. They went with me to see Fuller who showed me the Portland Soc. Nat. Hist. Rooms and his own cabinet, gave me a few things. . . . Nov. 8: Took out of the library the first two vols. of Hall's *Paleontology of N. Y.* to try to name my fossils in the Society's collection. If I can make sure of the genera I shall do well. . . . Nov. 12: Received letter from Dr. Clemens. He got my moths safe—4 or 5 new species. I supposed there would be 50–60 species; only 30 or thereabouts. . . . Nov. 13: Sent an article on Labrador to the *Neptune.* Hope they will publish it. . . . Dec. 8: Received a letter from Dr. Dawson. He promises to send me his papers and aid in my Pleistocene fossil studies. . . . Dec. 24: Received a letter from Dr. Wood, will send me Johnstone's work on zoophytes in a week or two. Been arranging my Labrador specimens and commencing to work on the Radiata (jellyfish, starfishes, etc.)."

On May 15, 1861, Packard wrote to the Rev. C. C. Carpenter in Labrador, "You will hear distressing news of the most revolting and heartsickening rebellion that ever disgraced humanity. . . . The war will be a long, strong pull for both parties. . . . this accursed revolt will eventually result in a more glorious vindication of free institutions. . . . I have always enjoyed life, but that seven weeks in Labrador proves a constant charm. . . . Zoologically considered, it was very profitable. Most of the insects were of rare interest and all those I collected are now in Samuel Scudder's hands for determinations. The sea animals proved exceedingly interesting and their study has led me into a most profitable correspondence with Dr. Dawson."

In the summer of 1861, and again the following year, Packard was a volunteer member of a Maine geological survey party led by Prof. Hitchcock of Amherst College and Prof. Holmes. In addition to the collection of rocks and fossils for the survey, Packard collected insects for his own interest whenever the opportunity was afforded. He published reports on both activities that same year—*Report on the Geology of the Fish River Lakes, Maine, and Report on the Insects Collected on the Penobscot and Alleguash Rivers During August and September, 1861.*

In the fall he entered the Lawrence Scientific School at Harvard to study under Agassiz. Following are excerpts from his letters to his father written at this time: Oct. 8: "Then I went into the museum and saw the Professor (Agassiz) who put me to work on a moth and I have been several hours looking at the wings and their make. There is Shurtleff by me studying entomology and Scudder will be in soon. I am rooming with Morse for a few days now till Hanson vacates the room. Prof. Agassiz has not commenced his lectures yet. . . . Oct. 14, I am going to the Lowell Institute School for Design to take drawing lessons all the winter fee gratis. . . . Oct. 31: Prof. Agassiz has agreed to remit, or not to ask the tuition 100 dollars for the year upon my telling him how I was situated and on the condition that I should do extra work taking care of insects, etc. which would only be a part of my study as an entomologist. He said he would not set me to work doing anything he would not do himself. . . . I am going to have a long talk with Prof. Agassiz about staying here some years if he will pay me enough to pay my expenses—In hopes of being one of the entomological curators in the museum. Some of the students here he gives $300 per year to keep them here and I might tend medical lectures and get a degree meanwhile. . . . Jan. 11: I have been informed indirectly that the Professor is desirous of having me as an assistant in the entomological dept. of the Museum. He has several times spoken to me of my industry and was much pleased with my arrangement of the wasps. (Five years later he published a monograph on *Revision of the Fossorial Hymenoptera of North America,* and during his lifetime he described 101 new species of Hymenoptera). Yesterday I spoke to him about some interesting affinities of a moth to another insect far removed in structure and he was so much pleased with my discovery that he told me to make a communication to the Boston Society about it and show to entomologists in the country how they studied insects in the Museum. So that the coveted situation seems to be in my reach and the object of my ambition not so far off as I feared to spend my life among scientific pursuits. . . . April 27, 1862: I am going out to Braintree after some trilobites with a party of us with Prof. Marcou who has lately been appointed to a place in the Museum to arrange fossils. . . . Oct. 17: I work on bees, etc., in the forenoon and on moths in the afternoon. . . . Oct. 27: Putnam who has the best rooms in Zoological Hall asked me to room with him this winter. Yesterday I moved up here. . . . I have had some correspondence with Hitchcock, though I feel provoked at my shabby treatment in not having been employed on the survey. I shall prepare a report this year of 50 pp. on methods of observing and collecting insects to be illustrated by wood cuts. . . . Prof. Agassiz is very hard up. He has all along paid out $4,000 annually in salaries out of his own pocket! I have no doubt that I can eventually work into a place in the Museum to take charge of the insects with salary enough to pay my expenses unless the war is greatly prolonged."

Alpheus wrote to his father Sept. 23, 1863, "We are rather lonely at the Museum. Only Putnam and myself in our large room. One new student has presented himself. The other depts. of the Scientific School are quite full. Oct. 5: Prof. Agassiz comes up from Nahant occasionally. When he saw me he asked me if I could go to work and unpack, label and arrange the insects. I told him I could but that the only thing in the way was the money question. He said he would give me $400 a year and part of my time to work for my private study, an arrangement very agreeable so I agreed to be here six months until the last of March. I shall have just enough to live upon, which was all I dared to ask for the first year. Moreover he told me that he liked me and it was his wish to retain me here permanently as a Curator of Entomology. Later: I guess I shall stand for Curator of Crustacea in the Society (Boston Soc. Nat. Hist.). It will be of some advantage." Packard's later work on Crustacea was outstanding for his studies on phyllopods, culminating in his *Monograph of the Phyllopod Crustacea of North America* (1883). He described during his life time a total of five genera and 34 species of Crustacea.

The situation at the Museum soon became an unhappy one because of a new ruling that assistants could not possess a private collection, that any such must be given to or deposited at the Museum, and all work done at the Museum became property of the institution. This led to a withdrawal of nearly all of Agassiz's student-assistants, including Packard. An account of this "secession" will be made the subject of a separate paper now in preparation. In the spring of 1864 Packard received his M.D. degree from the Medical School of Maine at Bowdoin College and his S.B. degree from the Lawrence Scientific School.

Shortly thereafter he made another trip to Labrador. On May 21 he wrote to Frederic Putnam, "I am going up to Labrador with Bradford the artist to spend the summer.—I pay $200 and hope to pay at least two-thirds of my expenses by the sale of my specimens. The college here will take a portion—as will also Prof. Chadbourne for Williams. I shall want the Boston Soc. to take some.—I am going to write Stimpson and Baird if I can get a little appropriation from the Smithsonian.—I think the Essex Institute had also made up its mind to take some specimens. I think the trip will be of great advantage to me in every respect.—I think it will be a good thing in regard to prospect of getting employment at Boston Soc. to making a splurge of this kind."

On October 17, 1864, he went to Washington to begin service as an Assistant Surgeon in the First Maine Veteran Regiment. While there he visited the Smithsonian Institution where he met Baird, Gill, and Stimpson with whom he had corresponded. Baird invited him to his home and was very kind to him.

Upon his return from war service in 1865 his professional career in natural history and entomology began, which proved to be a long and productive one in which he became distinguished as a leader in American science. This paper has shown that the seeds of nearly all his accomplishments were clearly evident in his youth.

References

Cockerell, T. D. A. 1903. The making of biologists. Pop. Sci. Month. Apr. issue, 512–520.

————. 1920. Biographical memoir of Alpheus Spring Packard 1839–1905. *Biographical Memoirs. Nat. Acad. Sci., 9,* 181–236. Contains a complete bibliography of A. S. Packard which should be consulted for references to the publications mentioned in the present paper.

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BULLETIN

OF THE

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Vol. LII DECEMBER, 1957 No. 5

NEW SYNONYMY OF A NORTH AMERICAN ANT, APHAENOGASTER MACROSPINA M. R. SMITH (HYMENOPTERA: FORMICIDAE)

By Marion R. Smith,[1] Washington, D. C.

Recently a colleague suggested that *Aphaenogaster macrospina* M. R. Smith might be a synonym of *Aphaenogaster flemingi* M. R. Smith and requested that I examine types and other specimens of both species which are in the collection of the U. S. National Museum. A careful study of this material indicates that *macrospina* and *flemingi* are conspecific. *A. flemingi* was described from minor workers of an incipient colony and *macrospina* from large workers of a mature colony. Under the name *macrospina, flemingi* has been recorded from the following states: Alabama, Florida, Georgia, Mississippi, and South Carolina. Colonies are known to nest in rotting wood (pine stumps) and may also nest in the soil. The male and female have not yet been described. The synonymy is as follows:

Aphaenogaster (*Attomyrma*) *flemingi* M. R. Smith

Aphaenogaster texana flemingi M. R. Smith, 1928. Ent. News 39: 275–276, *worker.* Type locality, State College (formerly A. and M. College), Mississippi. Types in U. S. National Museum, Museum of Comparative Zoology, Harvard University, and the collection of W. S. Creighton. (Raised to specific rank by Creighton, 1950.)

Aphaenogaster texana macrospina M. R. Smith, 1934. Ent. Soc. Amer. Ann. 27: 386–387, *worker,* figs. 1, 2. Type locality, Navy Yard, Charleston, S. C. Types in U. S. National Museum. (Raised to specific rank by Creighton, 1950.) ***New synonymy.***

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[1] Entomology Research Division, Agricultural Research Service, United States Department of Agriculture.

A NEW GENUS AND TWO NEW SPECIES OF CHAMAEMYIIDAE (DIPTERA) FEEDING ON ORTHEZIA SCALE INSECTS

By Curtis W. Sabrosky,[1] Washington, D. C.

This paper describes a new species and new genus of the dipterous family Chamaemyiidae reared from *Orthezia* scale insects in Peru. The biology of the species is discussed by the collector, Oscar Beingolea, in another part of this Bulletin. A second new species of the same genus, reared from *Orthezia* in the British West Indies, is also described herein. I am indebted to J. E. Wille, of the Estacion Experimental Agricola de La Molina, Peru, and to F. J. Simmonds, of the Commonwealth Institute of Entomology, for the material upon which these descriptions are based.

Melaleucopis n. gen.

(*melas,* dark + *Leucopis*)

Related to *Leucopis,* but predominantly shining black; head short and broad, twice as high as long; occiput concave, not developed behind eyes, the latter large and bare; front without pollen, highly shining, anteriorly emarginate; lunule conspicuous, with numerous hairs; face broad, widening below, broadly rounded median carina continuing ventrad from lunule and widely separating bases of antennae; oral opening small; front strongly arcuate in profile, and antenna inserted at or slightly below middle of head and below middle of eye; length of head at antenna twice that at vibrissal angle, the cheek short; antenna subporrect, with short, microscopically pubescent arista; one reclinate orbital and inner and outer vertical bristles long and strong; ocellars distinct but weaker and shorter than the preceding, lateroclinate to proclinate; postverticals absent.

Body short and stocky, mesonotum highly convex. Chaetotaxy: 1 humeral, 1 + 1 notopleural, 1 presutural, 2 posterior dorsocentral, 1 supraalar, 1 postalar, 1 posterior intraalar, 1 apical and 1 subapical scutellar, and 1 sternopleural pairs of bristles, the anterior dorsocentral shorter and weaker than the others; mesopleuron without hairs or bristles; no propleural or stigmatical bristles.

Legs as in *Leucopis,* short and weak.

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[1] Entomology Research Division, Agricultural Research Service, U.S.D.A.

Wing venation in general as in *Leucopis,* but the second basal and discal cells confluent, with only a stub of crossvein at usual point of division; ultimate section of fourth vein concave anteriorly, the third and fourth veins slightly converging; calypter fringed with long, erect hairs.

Type species, *Melaleucopis ortheziavora* n. sp.

The position of *Melaleucopis* in the family can be seen from the following abbreviated key:

1. Lunule large, with numerous hairs, the front anteriorly emarginate; postvertical bristles absent 2
   Lunule usually smaller, bare, the front usually not emarginate and the lunule narrow and inconspicuous; postverticals present except in *Paraleucopis* and *Cremifania.* All other Chamaemyiidae
2. Second basal and discal cells separated; no orbital bristles except in subgenus *Leucopiola* Frey; front gray pollinose; entire body heavily gray pollinose .... *Leucopis* sens. lat.
   Second basal and discal cells confluent, only a stub of the crossvein present; one pair of strong, reclinate orbital bristles; front shining black, without pollen; body shining black, though finely dark pollinose ...... *Melaleucopis* n. gen.

Melaleucopis appears to be most closely related to *Leucopis,* although of quite different habitus because of the latter's densely gray pollinose appearance. It resembles *Leucopis* in the shape of head and body, development and hairiness of the lunule, absence of postvertical and propleural bristles, and presence of two pairs of dorsocentral bristles and a pair of strong presuturals.

The dark shining appearance will suggest *Pseudodinia* or*Paraleucopis,* but those genera have the second basal and discal cells separated, mesopleuron with some hairs or a strong bristle, bare and narrow lunule, and longer head similar to that of *Chamaemyia.* The single pair of strong reclinate orbital bristles, a characteristic quite unlike *Leucopis,* is also found in the Australian genus *Chaetoleucopis* Malloch, but the latter has a bare lunule, strong postvertical bristles, a propleural bristle, and second basal and discal cells separated.

It may be pointed out that the two species of *Melaleucopis* differ in the presence and absence of prescutellar acrostical bristles, a character which has been used in the subdivision of *Leucopis.* I cannot believe that the two species before me belong in different subgenera on the basis of that character alone, and I suspect also that it may not be significant in *Leucopis*. The following key may be used to separate the two species.

1. No prescutellar acrostical bristles; tarsi with distal three segments infuscated; front as wide or wider than an eye. *M. ortheziavora* n. sp.

   Strong prescutellar acrosticals present, tarsi entirely yellow; front narrower than an eye .... *M. simmondsi* n. sp.

Melaleucopis ortheziavora n. sp.

Predominantly shining black, the upper half of pleuron conspicuously bright gray pollinose.

Male, female.—Black, the proximal two segments of all tarsi yellow, knob of halter cream-white and stalk brown, and veins brown, paling toward base of wing; abdomen with greenish-black shine; upper half of pleuron silvery gray pollinose, contrasting with remainder of thorax.

Front nearly square, wider than an eye and nearly two-fifths the width of head; frontal triangle long and narrow, ending acutely at anterior margin of front; orbits and triangle smooth and highly polished, remainder of front shining and non-pollinose but finely rugulose; ocellar tubercle finely pollinose and dull; frontalia and triangle with scattered fine hairs; upper orbits bare, but a row of fine erect hairs anterior to the orbital bristle; lunule with upper margin nearly straight, shining though finely pollinose, with a number of fine, erect black hairs like those of front, the hairs usually extending ventrad between the antennae; cheek one-fifth the eye height and three-fifths the breadth of third antennal segment; the latter large and rounded; orbital bristle situated midway between vertex and level of antennal bases.

Thorax highly shining, though finely dark pollinose throughout except for silvery-gray pollinose upper half of pleuron; mesonotum with numerous long hairs, bare on notopleuron and posterior slope behind level of posterior dorsocentrals; scutellum, meso- and pteropleuron bare of hairs.

Abdomen like thorax, shining but finely pollinose, with numerous hairs.

Wing with fore crossvein slightly beyond middle of discal cell, the apex of latter truncate, the cell three times as wide at apex as at base; hind crossvein straight and long, equal to ultimate section of fifth vein.

Male terminalia heavily sclerotized, smooth and polished, the ninth tergum large, with row of long bristles along posterior margin, strongly produced ventrad on each side as an elongate genital forceps with acute apex.

Length of body, 1.25–1.5 mm.; of wing. 1.5–1.75 mm.

Holotype male, *allotype,* and nine *paratypes* (2 males, 7 females), Yauca, Peru, November and December 1955, reared from *Orthezia* (Beingolea). Type No. 63544 in the U. S. National Museum, with some paratypes deposited in the collection of the Estacion Experimental Agricola de La Molina, Peru. Over 30 other specimens were also available for study, but they are not in good condition and have not been included in the type series.

Melaleucopis simmondsi n. sp.

As described for *M. ortheziavora* except as follows: Color same, except for entirely yellow tarsi and broadly yellow knees. Front narrower than long, at vertex less than eye width and approximately three-tenths the width of head, more deeply emarginate anteriorly; frontal triangle acuminate, reaching anterior margin of front but little wider than frontalia on each side; ocellar tubercle non-pollinose, shining; lower orbits rugose; lunule larger, arcuate above, dull gray pollinose, more densely covered with fine hairs, which end well below antennal bases; cheek narrower, only one-ninth the eye height; antenna proportionately smaller; orbital bristle only one-third way from vertex to antennal base, though about midway between vertex and upper margins of lunule; ocellar bristles weak, little longer than hairs and not distinct. Thorax with strong pair of prescutellar acrostical bristles, inserted slightly behind posterior dorsocentrals, and twice the length of the anterior dorsocentrals, the latter shorter than in *ortheziavora.* Wing with discal cell shorter, hind crossvein farther from wing margin, and ultimate section of fifth vein longer than hind crossvein.

Holotype and five *paratypes,* Carriacou, the Grenadines, Windward Islands, British West Indies, August 1951, from *Orthezia* on *Euphorbia* (F. J. Simmonds); one paratype, same locality, Oct. 24, 1952, from *Orthezia* on lime (F. D. Bennett). Type No. 63545 in the U. S. National Museum, paratypes returned to F. J. Simmonds.

The type series is mounted in such a way that the sex of the specimens cannot be determined with certainty. Two other specimens from the first lot and four from the second were also available for study, but are damaged and are not included in the type series.

NOTES ON A CHAMAEMYIID (DIPTERA) PREDATOR OF THE EGGS OF ORTHEZIA INSIGNIS DOUGLAS (HOMOPTERA) IN PERU

By Oscar Beingolea G.,[1] Lima, Peru

The flies of the family Chamaemyiidae are characterized by the predaceous habits of their larvae, which prey especially upon aphids and eggs of non-diaspine scale insects. Clausen (1) places this family, according to the habits of their entomophagous larvae, among those only predaceous.

One species of the family has been found in Peru associated with *Orthezia insignis* Douglas on olive trees, the eggs of *Orthezia* being devoured by the larvae of the fly. It was first observed in November 1955, in Yauca Valley, on olive trees infested with *O. insignis,* during routine observations on *Saissetia oleae* Bern. The external symptoms of attack, once the puparium is formed, are so striking that they attracted the author's attention. Specimens collected on that occasion and kept separately in gelatin capsules gave the first adults of this fly. Since then it has been found associated with *Orthezia* in the olive-growing valleys of Camaná and Acarí.

This fly was identified by Kenneth E. Frick of the Agricultural Experiment Station, Prosser, Washington, as a species of a genus near *Leucopis.* E. O. Essig (2) mentions that the larvae of *Leucopis bellula* Williston feed "on mealybugs, cottony cochineal scale and *Orthezia,*" so predatism upon *Orthezia* is not a novelty in this family. The species is described as *Melaleucopis ortheziavora* by Curtis W. Sabrosky in a paper accompanying this one.

Morphology

Egg.—The egg (Fig. 1) is dark-brown, almost black and very small, proportionate to the size of the adult; it is 0.28–0.34 mm. long and 0.10–0.15 mm. wide. Its shape is elongate oval with one end somewhat narrower than the other; it is flat ventrally and markedly convex dorsally.

Larva.—The larva (Fig. 2) is muscoidiform. In the first instar it is elongate, but becomes progressively more and more round-oval as it develops. First instar larvae measure 0.38–0.54 mm. in length; last instar larvae attain 1.8 mm. in length. Segmentation is evident in all instars.

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[1] Jefe de la Brigada No. 3 de Defensa Agrícola. Dirección General de Agricultura. Ministerio de Agricultura.

Puparium (Fig. 3.)—Seen from above it is elliptical; in profile it presents a somewhat flattened ventral surface and narrowed front end. It is reddish-brown in color and measures 1.3–1.9 mm. by 0.60–0.96 mm. It presents no clear segmentation except in the anterior portion, but in puparia made translucent by boiling in sodium hydroxide it is possible to see indistinct segmentation. The entire anterior portion usually breaks off at the emergence of the adult, although occasionally it divides into two halves which may or may not detach from the puparium (Fig. 4). Small spines belonging to the larval skin may be seen all over the surface of the puparium. Fleshy spines are present on the larvae, but only a few on the dorsum have been included on the drawing (Fig. 2). Unlike *Leucopis,* the posterior spiracles are not borne upon long processes, have no fingerlike projections, and are hardly visible. Puparia recently separated from the host show their posterior end, by which they adhere to it, covered with a black, adhesive substance.

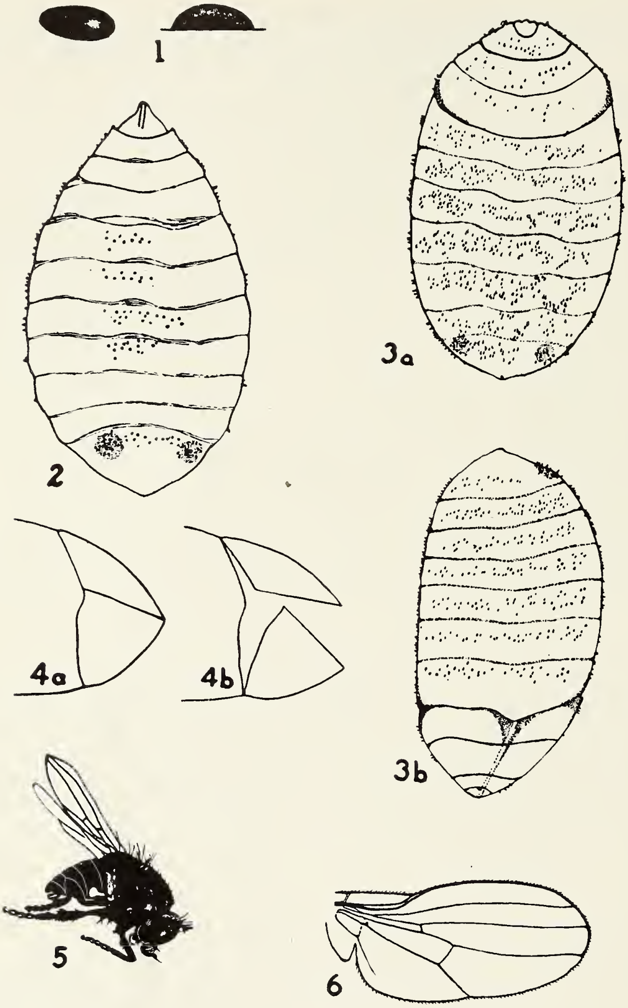
Adult (Fig. 5).—A small fly, 1.4 to 2.0 mm. long, all shining-black except for the tarsal segments of all three pairs of legs which are yellowish. The halteres are rather large for a fly of its size and are cream-yellow in color. Detail of wing is presented in Fig. 6.

GENERAL BIOLOGY

Through the observations already made, though few, it has been possible to establish the following features. Eggs are laid externally on the egg sac of *Orthezia,* at or below the posterior end of it and are firmly affixed to the waxy processes of the same. To perform oviposition the female fly climbs up the host, parallel to the long axis, after which it moves backwards and curling its abdomen deposits an egg. Most of the eggs are laid on individuals with fully developed egg sac, but some are also laid on individuals in which growth of the sac is just starting.

Computation on 127 eggs gave these approximate figures: 70% of the eggs are laid on the extremity of the egg sac and 30% beneath it, but always very near its end; 70% of the host egg sacs bear a single egg, 25% bear two eggs and 5% bear three eggs.

The larva lives inside the egg sac and devours the eggs. Once development is over, the puparium is formed within the egg sac and remains there after the adult fly has emerged. The author has often seen live individuals of *Orthezia* bearing already formed puparia. The puparium is found attached to the scale and it offers a marked resistance to separation; its orientation is with its anterior end directed to the posterior end of the egg sac. Sometimes it adheres to a cup formed by the remains of the first abdominal



EXPLANATION OF PLATE

Melaleucopis ortheziavora Sabrosky. Fig. 1. Egg. Fig. 2. Larva: last instar, dorsal view. Fig. 3. Puparium: dorsal and lateral views. Fig. 4. Anterior end of puparium showing the lines of fracture. Fig. 5. Adult (male). Fig. 6. Right wing.

segments of the host; this fact suggests that occasionally the abdomen is devoured too. This must only occasionally happen, because many times adherence is not strong and the abdomen of the still living host appears undamaged though shrunken due to complete evacuation of eggs.

Although more than 80% of the fully matured females of *Orthezia* are attacked, it is frequent to find in the same egg sac in addition to an active maggot preying upon the eggs, a good many healthy eggs, and recently emerged *Orthezia* larvae ready to leave. Thus it is certain that not all of the scale eggs are destroyed; this is confirmed by the fact that in spite of the heavy predatism it is often possible to find high infestations of this scale.

Though, as pointed out before, oviposition may be multiple, it never develops into multiple attack. As a matter of fact the egg sac affords room for no more than one mature larva and later one puparium. It is not clear whether or not, in this case, there exists any sort of competition among the hatched larvae.

It is worth while to mention the existence of a secondary parasite, a small wasp whose identification is impossible at present because of lack of specimens. It must play an unimportant role because only two specimens have been secured during the rearing of more than one hundred flies.

Summary

A fly of the family *Chamaemyiidae,* of a new genus near *Leucopis,* preys in the larval stage upon the eggs of *Orthezia insignis* Douglas (Ortheziinae), which attacks olive and other plants in some coastal valleys of Peru. The different biological stages and the interrelations with *Orthezia* are described. Eggs are laid on the waxy processes of the egg sac of *Orthezia* females and the larvae live inside it devouring the egg and occasionally the abdomen too, as suggested by some observations made. The puparium is found within the egg sac, adhering to the intact abdomen of the host or to the remains of the first abdominal segments. Not all of the eggs in a given sac are destroyed, and thus, although the predatism reaches to more than 80% of the *Orthezia* egg sacs, high infestations of this scale often occur. Several eggs may be placed on a single host but no more than one larva of the fly has ever been found in any single *Orthezia* egg sac.

Literature Cited

1 **Clausen, Curtis P.** 1940. Entomophagous insects. McGraw-Hill Book Company, New York, N. Y.

2 **Essig, E. O.** 1953. Insects of Western North America. The Macmillan Company, New York, N. Y.

SYNONYMS OF BEMISIA TABACI (GENNADIUS) (HOMOPTERA, ALEYRODIDAE)

By Louise M. Russell,[1] Washington, D. C.

The following synonymy is presented in order that the information may be available to entomologists and plant pathologists concerned with the insects and the viruses that they transmit to cotton, tobacco, and other plants of economic importance. Several additional names may prove to be synonyms of *tabaci,* but these are not discussed herein. This paper precedes a longer, more detailed one dealing with *tabaci.*

Aleurodes tabaci Gennadius, 1889, Ellenike Georgia (Greek Agriculture) (Athens), pp. [1]–3.

Bemisia tabaci (Gennadius), Takahashi, 1936, Tenthredo 1(n.2): 110–111.

Aleyrodes inconspicua Quaintance, 1900, U. S. Dept. Agr., Div. Ent., Tech. Ser. 8: 28–29, illus. ***New synonymy.***

Bemisia inconspicua (Quaintance), Quaintance and Baker, 1914, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 27: 99–100, illus.

Bemisia costa-limai Bondar, 1928, Aleyrodideos do Brasil (2nd Contrib.), pp. 27–29, illus. ***New synonymy.***

Bemisia signata Bondar, 1928, Aleyrodideos do Brasil (2nd Contrib.), pp. 29–30, illus. ***New synonymy.***

Bemisia bahiana Bondar, 1928, Aleyrodideos do Brasil (2nd Contrib.), pp. 30–31, illus. ***New synonymy.***

Bemisia gossypiperda Misra and Lamba, 1929, Agr. Res. Instit. Pusa, Bul. 196, 7 pp., illus.

Bemisia hibisci Takahashi, 1933, Dept. Agr. Gov. Res. Instit. Formosa Rpt. 60: 17–18, illus.

Bemisia gossypiperda Misra and Lamba, variety *mosaicivectura* Ghesquière, 1934, Ann. de Gembloux (Bruxelles), pp. 30–31, illus. ***New synonymy.***

Bemisia longispina Priesner and Hosny, 1934, Egypt Min. Agr., Tech. and Scien. Service (Ent. sec.) Bul. 139: 6, illus. ***New synonymy.***

Bemisia goldingi Corbett, 1935, Ann. and Mag. Nat. Hist. (ser. 10)16: 249–250, illus. ***New synonymy.***

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[1] Entomology Research Division, Agricultural Research Service, United States Department of Agriculture.

Bemisia nigeriensis Corbett, 1935, Ann. & Mag. Nat. Hist. (ser. 10) 16: 250–252, illus. ***New synonymy.***

Bemisia rhodesiaensis Corbett, 1936, Roy. Ent. Soc. London Proc. (ser. B) 5: 22, illus. ***New synonymy.***

I have studied type specimens of *tabaci, inconspicua, costa-limai, signata, bahiana, longispina, gossypiperda* variety *mosaicivectura, goldingi,* and *rhodesiaensis.* I have not examined types of *gossypiperda, hibisci,* or *nigeriensis,* but have seen specimens from the hosts and countries, or general areas, from which they were described. On the basis of these studies and consideration of the original descriptions, it appears that these names are synonyms of *tabaci.*

Takahashi (1936, Tenthredo, 1(n.2): 110) listed *gossypiperda* and *hibisci* as synonyms of *tabaci.* Later he (1955, Kontyu, 23(n.1):2) recognized both *gossypiperda* Misra and Lamba and *tabaci* (Gennadius) as valid species and indicated that he believed his 1936 treatment of *gossypiperda* was in error. In my opinion, however, his 1936 action was correct, and his 1955 action erroneous.

The unique specimen described as *Aspidiotus gossypii* Fitch (1856, N. Y. State Agric. Soc. Trans. 16: 332) may represent the species here called *tabaci.* If this were the case, *gossypii,* being the older name, would have priority. It is impossible to determine this matter, however, because the type or *gossypii* has not been located, and because the original description and subsequent brief mentions of it are not adequate for the recognition of the species. Unless the type can be recovered, the identity of *gossypii* will remain questionable.

THANKS FROM THE SOCIETY

At this Yuletide Season the Society wishes to extend to Dr. George S. Tulloch its grateful appreciation for his handling of the Bulletin as Editor from 1949 to his retirement in the fall of 1957.

Dr. Tulloch has contributed most generously of his personal time and efforts. The success of the Bulletin and its growing recognition in the field of research is in large measure due to his skillful direction.

A NEW PARASITE OF THE RHODES–GRASS SCALE (HYMENOPTERA, ENCYRTIDAE).

By B. D. Burks,[1] Washington, D. C.

In October 1956 material of the Rhodes-grass scale, *Antonina graminis* (Mask.), collected by G. W. Angalet near New Delhi, India, yielded numerous specimens of an unknown encyrtid parasite. The female of this encyrtid is almost wingless, retaining only minute vestiges of the wings, and the thorax is strikingly broad and compact. The male is quite different, being fully winged and with a thorax of normal encyrtid proportions.

The females of this species have 2-toothed mandibles; the antennal scape is widened and flattened, but not greatly so; the pedicel is longer than the first funicle segment and there are 6 short, semiquadrate funicle segments; the frons is broad, with the antennae inserted very near the mouth border; the occipital margin is subcarinate; the pronotum and praescutum are nearly equal in width and not greatly different in length (Fig. 1); the axillae are quite small, but clearly are present; the tegulae are of normal size, but the forewings are reduced to minute vestiges which extend only to the propodeum; the scutellum is large and broadly rounded apically; the propodeum is very short on the meson; the gaster is longer than the head and thorax combined; and the cerci have migrated far forward to a position one-third to one-quarter the distance from the base to the apex of the gaster. The thorax is non-metallic in color and is clothed with dark-brown microsetae; the antennal club is white, in striking contrast to the very dark brown funicle.

This combination of characters strongly suggests the genus *Dusmetia* Mercet (1921, Fauna Ibérica, Himenópteros, fam. Encírtidos, p. 151) without entirely agreeing with the description of it. This parasite of the Rhodes-grass scale does not agree with *Dusmetia* which is characterized as having the body red and clothed with white hairs, the occipital margin acute rather than subacute, the gaster only as long as the thorax, and with the cerci located about one-half the distance from the base to the apex of the gaster. The male of *Dusmetia* is quite similar to the female, with the wings greatly reduced.

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[1] Entomology Research Division, Agr. Res. Serv., U.S.D.A.

This parasite of the Rhodes-grass scale cannot be placed generically in Ashmead's key (1904, Carnegie Museum Mem. 1: 165), but in both Mercet's key (*loc. cit.*, p. 60) and Ferrière's key (1953, Mitt. Schweiz. Ent. Ges. 26: 7) it runs fairly well to *Dusmetia.* It agrees quite well with Hoffer's characterization of his subtribe Dusmetii (1953, Sbornik Ent. odd. nar. Mus. Praze 5: 79) and with his re-definition of the female of the genus *Dusmetia,* except for the color of the pubescence and the absence of traces of the parapsidal furrows.

As this parasite has many more characters in agreement with *Dusmetia* than differences from it, it seems better to refer the species to that genus than to describe a new genus of doubtful value for it. The fact that the male is fully winged while the male of the genotype species, *D. ceballosi* Mercet, is brachypterous like its female, is probably not generically significant. In the related *Dicarnosis helena* Hoffer (*loc. cit.*, p. 90) both macropterous and brachypterous males are known, and it is possible the species described here will eventually be found to have both macropterous and brachypterous forms.

Dusmetia indica n. sp.

Female.—Length 0.8–1.0 mm. Head tan, with area between antennal bases and mouth border shaded with black; antennal scape and pedicel, thorax, legs, and propodeum light tan; antennal funicle very dark brown, club white; gaster dark brown, slightly lighter on ninth tergite.

Eyes not hairy; head smooth, with scattered, very short and fine, dark brown micro-setae; body clothed with longer and more numerous, appressed micro-setae, these tending to form longitudinal rows on thoracic dorsum, their arrangement on gaster more haphazard; tibiae densely clothed with appressed, golden micro-setae apically; each cercus bearing 3 long bristles.

Mandible (Fig. 5) with dorsal tooth longer than ventral one. Antennae inserted very low on frons, width of space between antennal socket and mouth border one-half as great as maximum width of scape; a very low, rounded protuberance present between antennal bases; area of face lateral to antennal sockets indented. Antennal scape (Fig. 2) broadened in the middle, its maximum width one-half as great as its length; relative lengths of parts of antenna—scape 40, pedicel 20, first funicle segment 11, second 9, third 9, fourth 10, fifth 10, sixth 11, club 38; first funicle segment slightly longer than wide, second and following segments slightly wider than long and becoming progressively wider toward the apex, second segment 1 1/10 times as wide as long, sixth segment 1 1/3 times as wide as long. Eyes small and slightly diverging ventrally, maximum width of frons 2 1/2 times as great as width of eye and 1 2/3 times as great as length of eye. Ocelli forming an obtuse angle of about 100°, length of postocellar line 1 1/4 times as great as length of ocellocular line and 3 times as great as line from lateral ocellus to vertexal margin; width of head slightly greater than maximum width of thorax.

Thorax broad and compact, pronotum at meson 3/4 as long as praescutum; axillae not quite meeting on meson; posterior margin of scutellum broadly rounded, length of scutellum at meson 1 1/4 times as great as length of praescutum; no parapsidal furrows visible; tegula inflated and relatively large, being almost as long as the vestigial forewing (Fig. 1); legs stout, femora and tibiae somewhat flattened, but lateral margins not carinate.

Propodeum extremely short at meson, posterior and anterior margins almost in contact; propodeum considerably wider laterally, but normally covered by first gastral tergite; propodeal spiracle round, space separating it from anterior propodeal margin twice as great as its diameter. Gaster twice as long as thorax, tips of ovipositor sheaths projecting slightly beyond apex of gaster; cerci situated at a point 1/4 to 1/3 the distance from the base to the apex of gaster; basal 6 gastral tergites telescoped on dorsum, but posterior margin of each tergite clearly visible; basal gastral tergite (abdominal segment III) 3/4 as long as following 5 tergites combined; posterior margin of gastral tergite 4 (abdominal segment VI) emarginate on meson, posterior margins of other tergites broadly rounded from side to side; on meson posterior margins of tergites 3–6 (abdominal segments V–VIII) located posterior to cerci; ninth tergite on meson 1 2/3 times as long as basal tergites.

Male.—Length 0.7–0.8 mm. Black, with antennal scape and pedicel tan, funicle and club black; tegulae and legs distad of coxae tan; wings hyaline, venation black, forewing with faint gray shading posterior to apex of submarginal vein and around marginal and stigmal veins.

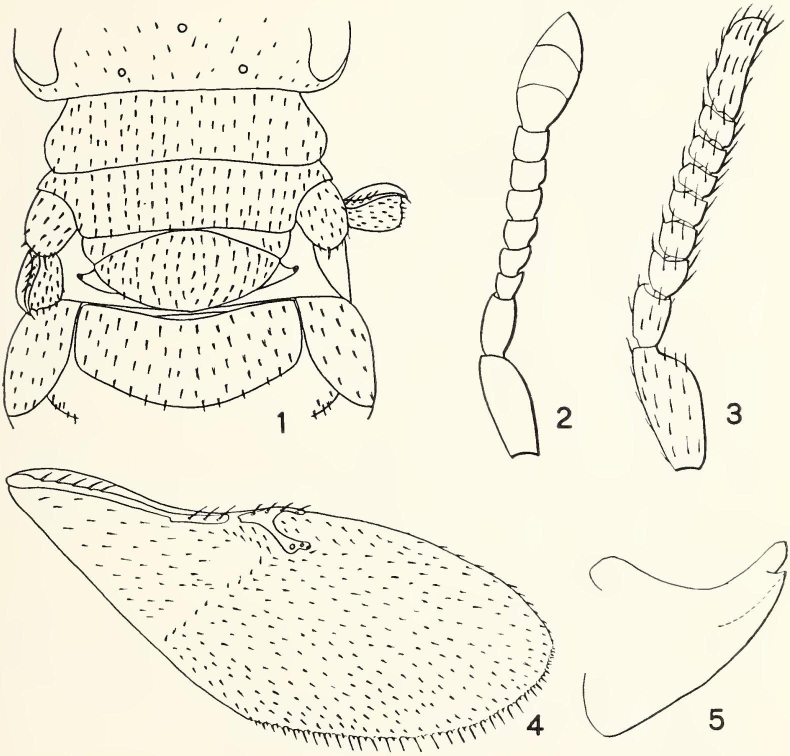
Antenna (Fig. 3) with scape twice as long as wide; relative lengths of parts of antenna—scape 40, pedicel 18, first funicle segment 8, second 8, third 8, fourth 8, fifth 8, sixth 8, club 24; club unsegmented. Forewing (Fig. 4) with marginal and postmarginal veins short, stigmal vein relatively long; mesopraescutum without parapsidal furrows; scutellum flattened, subtriangular.

Propodeum slightly longer on meson than in female. Gaster 1 1/5 times as long as thorax; cerci located at a point 1/3 the distance from base to apex of gaster.

Type locality.—Near New Delhi, India.

Types.—U. S. N. M. no. 63,541.

Described from the female holotype, male allotype, and 2 male and 11 female paratypes, from near New Delhi, India, Oct. 31, 1956, reared from *Antonina graminis* (Mask.), G. W. Angalet. Additional specimens, not included in the type series, emerged at Moorestown, N. J., Jan. 1957, from *Antonina graminis* material collected near New Delhi, India, by G. W. Angalet and forwarded to the United States for rearing.



Dusmetia indica: Fig. 1. Posterior portion of head, thorax, and anterior portion of gaster of female, dorsal aspect. Fig. 2. Antenna of female. Fig. 3. Antenna of male. Fig. 4. Fore wing of male. Fig. 5. Mandible of female.

NEW NEOTROPICAL HALOBATINAE (HEMIPTERA: GERRIDAE).

By Carl J. Drake[1]

The present paper contains the descriptions of three new species of the Genus *Brachymetra* Mayr from South America. The types are in the Drake Collection (U.S.N.M.).

Brachymetra furva n. sp.

Moderately large, robust, dark chocolate brown with a prominent patch of silvery white hairs on superior surface of each acetabulum of middle and hind legs. Body beneath brownish flavous. Legs and antennae blackish fuscous. Length, 6.00–6.50 mm.; width (widest) 2.25–2.50 mm. Alate form unknown.

Width of head across eyes 1.65 mm. Antennal measurements —(male) I, 1.40 mm.; II, 0.70 mm.; III, 0.90 mm.; IV, 0.75 mm. and (female) I, 1.40 mm.; II, 0.70 mm.; III, 0.90 mm.; IV, 0.82 mm. Labium brownish testaceous, extending onto anterior part of mesonotum. Anterior legs with femur much shorter than in other legs, 2.25 mm. long, the tibia 2.05 mm. Middle legs with femur 5.50 mm. long and tibia 5.80 mm. Hind legs with femur 5.80 mm. long and tibia 2.70 mm.

Pronotum 2.50 mm. long in both sexes, slowly narrowed back of humeri, with apex broadly rounded and terminating about three-fourths of a millimeter in front of base of abdomen. Abdomen 2.75 mm. long, with connexival segments slowly narrowed posteriorly, more sharply narrowed on last two segments; first visible tergite above excavated behind at the middle in both sexes. Male with last tergite above about one and one-half times longer than the preceding segment, beneath nearly two times and long. First genital segment above transversely convex, with lateral sides from near the base tapering slowly posteriorly. Parameres moderately long, convex within, tapering apically, somewhat similar in form to those of *B. anduzeei*. Female generally a little stouter than male; first visible tergite above with a small median protuberance. Last segment of venter almost twice as long as preceding segment.

Holotype (male) and *allotype* (female), both apterous, Rio de Janeiro, Brasil, Nov. 6, 1936, C. J. Drake. *Paratypes:* 3 specimens netted with type and 1 specimen, Vicosa, Minas Gerais, Brasil, Dr. T. Snipes.

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[1] Smithsonian Institution, Washington, D. C.

Allied to *B. anduzeei* Drake and Harris (1942) but readily separated from it by the more robust form, dark chocolate color, smaller first genital segment. The male parameres in the two species are rather similar in form but differ in length.

Brachymetra accola n. sp.

Apterous male: Large, rufus-brown, body beneath brownish stramineous. Pronotum and connexiva without markings. Antennae dark fuscous. Legs dark fuscous, anterior femur with most of basal half somewhat testaceous or brownish testaceous. Female and apterous forms unknown. Length, 7.50 mm.; width, 2.60 mm.

Head 1.90 mm. wide across eyes; eyes blackish, each slightly longer than width of vertex in front. Labium extending a little beyond prosternum, with apex blackish. Antennae with first segment 1.75 mm. long, second 0.80 mm. long, other two segments missing. Pronotum extremely long, 3.50 mm. in length, longly produced posteriorly, barely reaching to base of abdomen; front lobe medially impressed, then slightly raised on each side so as to form feebly elevated area; posterior part narrowed, somewhat shield-shape behind, with apex obtusely rounded. Abdomen 1.60 mm. long, rectangular (including tergites and connexiva) in outline, with last two connexival segments slowly roundly narrowed; first visible tergite concavely emarginate behind, seventh tergite broadly roundly excavated on hind margin. Male parameres flattened, concave within, with apical end tapering to a point, much shorter than these structures in *B. kleopatra.* Anterior femur much stouter than in other legs, 2.75 mm. long; tibia 2.50 mm. long, slightly bowed. Middle femur 7.00 mm. long, the tibia 7.25 mm.

Holotype (male), labeled "Brasil."

Most closely allied to *B. kleopatra,* but readily distinguished from it by the extremely long pronotum with apex obtusely roundly subangulate and barely reaching to base of abdomen and by the distinctly rectangularly-shaped abdomen. The parameres are also much shorter and quite distinctive in both species.

Brachymetra actuosa n. sp.

Large, testaceous brown, without markings on pronotum (one specimen with faint and partial indication of a median longitudinal (line); body beneath stramineous; hemelytra dark fuscous with veins lighter. Antennae fuscous, scarcely paler at base. Legs brownish fuscous, anterior pair mostly dark fuscous with basal half (or more above) testaceous; each acetabulum of middle and hind legs with a prominent patch of silvery white hairs. Labium pale testaceous with apex black, reaching a little beyond prosternum. Length (alate male), 8.00 mm.; and width, (greatest) 2.75 mm.

Macropterous male: Head 1.80 mm. wide across eyes. Antennal measurements—I, 1.55 mm.; II, 0.80 mm.; III, 1.12 mm.; IV, 0.94. Pronotum 4.00 mm. long and 2.35 mm. wide at humeral angles, with a shallow median impression in front, triangularly narrowed behind humeral angles, with apex rather narrow and bluntly rounded, length about one fourth longer behind humeri than in front of them, apical part of hind triangular part slightly transversely rugulose. Hemelytra 5.00 mm. long, extending a little more than half its length beyond apex of triangular part of pronotum, with short, dark brown hairs on outer edge of basal margin. Anterior femur a little more than twice as thick as median, 2.75 mm. long; tibia 2.25 mm. long, slightly bent. Middle femur 6.25 mm. long, the tibia 6.75 mm. Hind femur 7.50 mm. long, the tibia 6.50 mm. Last male venter a little longer than preceding segment, widely deeply excavated behind with basal margin of excavation slightly concave. Parameres slightly broader and much shorter than in *kleopatra,* tapering apically, flat, with inner surface concave.

Apterous female: Antennal and leg measurements as in alate form. Pronotum 3.20 mm. long, shield-shaped behind, with apex fairly wide, roundly obtusely angulate and terminating about one-half millimeter in front of basal margin of abdomen; first visible abdominal tergite concavely excavated at middle behind; last abdominal ventrite about one-half longer than the preceding segment Length, 7.50 mm.; width (greatest), 2.70 mm.

Holotype (alate male) and *allotype* (apterous female), Trinidad, B. W. I., Oct. 27–29, 1938, C. J. Drake. *Paratypes:* 1 macropterous male and 3 apterous females same data on labels as type.

Distinguished from *B. kleopatra* by the shorter and differently shaped parameres, measurements of antennal segments, obtusely rounded apex of pronotum in apterous form and slightly narrow posterior triangular part of pronotum in alate form.

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BULLETIN

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Vol. LIII FEBRUARY, 1958 No. 1

SIMULIUM DEFOLIARTI, A NEW BLACK FLY FROM THE WESTERN UNITED STATES (DIPTERA, SIMULIIDAE)

By Alan Stone[1] and B. V. Peterson[2]

We describe this species of black fly,[3] which is rather widely distributed in the mountains of the western United States, to provide a name for use in reporting the results of current biological studies.

Simulium defoliarti, n. sp.

Female.—Frons nearly black, shiny, with an irregular row of fine yellowish hairs near eye margin. Antenna 11-segmented, the scape, pedicel, and basal half of first flagellar segment yellowish brown, the remainder dark. Clypeus with gray pollinosity and pale hairs. Mandibles and maxillae toothed, as figured (Figs. 4, 5). Palpus dark as figured (Figs. 2a, 2b). Pharyngeal armature as figured (Fig. 3). Thorax dark with gray pollinosity and fine, recumbent, pale yellowish or golden hairs on scutum, these longer, erect, and convergent around margin of scutellum; viewed from certain angles, the scutum with a pair of curved dark lines, and a pair of triangular pale pollinose spots anteriorly; humeral angle

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[1] Entomology Research Division, Agricultural Research Service, United States Department of Agriculture, Washington, D. C.

[2] Department of Zoology, University of Utah, Salt Lake City, Utah.

[3] The illustrations that accompany this paper were made by S. Shibata, of the 406th Medical General Laboratory, U. S. Army, Tokyo, Japan, under the direction of Kakuzo Yamazaki. We are indebted to Major Hugh L. Keegan, MSC, Department of Entomology, and Colonel Milward W. Bayliss, MC, 406th Medical General Laboratory, for providing these drawings.

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somewhat reddish; pleuron dark, the membrane reddish; no hairs except for an upper mesepimeral tuft and a few near lower mesepimeral margin, pale yellow. Legs (Figs. 6a–c): fore coxae yellow, mid and hind coxae somewhat darkened; femora yellow, scarcely or not at all browned distally; tibiae yellow, blackened distally; fore tibia distinctly flattened; fore tarsus black, the first segment flattened; mid and hind basitarsi yellow except distally; other tarsal segments mostly dark; calcipala rather small; pedisulcus deep; claw with a small tooth, as figured (Fig. 6d). Wing with hairs on costa basad of humeral vein, and on stem vein pale yellow; subcosta with 8 to 10 fine hairs ventrally; radial sector bare above; vein R_1 with a row of short black spines. Halter pale. First abdominal tergite mostly yellowish brown, with long yellow hairs; tergites 2 to 5 dull reddish; 6 to 8 shiny, darker. Terminalia as figured (Figs. 8a, 8b).

Male.—Holoptic, the upper facets much larger than the lower ones. Clypeus dark with gray reflections and erect dark hair. Antenna and palpus nearly black. Scutum dark with a velvety spot anteriorly (white in certain lights) on each side, bordered posteriorly by a narrow white spot (black in certain lights). Lateral and posterior declivities pale gray by reflected light. Hairs of scutum recumbent, pale yellow, those of the antescutellar space erect; scutellum with recumbent yellow hair centrally and erect black hair on posterior margin. Postnotum dark, with grayish reflections. Pleuron black, tinged with reddish; upper mesepimeral tuft dark. Fore coxa pale brown, mid and hind coxae dark. Femora yellowish, with long, mostly dark hair; hind femur somewhat infuscated and apex with a dark spot, widest ventrally. Fore tibia about two-thirds white basally, except for ventral margin; mid tibia darkened apically; hind tibia pale on basal third; hind femur and tibia somewhat broadened. Fore tarsus dark; mid and hind basitarsi somewhat yellow on basal half or more; hind basitarsus about five times as long as greatest width; calcipala small. Wings with hairs at base of costa and stem vein dark; subcosta without hairs ventrally; radial sector bare above. Halter with base dark, stem and knob pale. First abdominal tergite dark with long dark hairs; tergites opaque black, with pale hair. Terminalia as figured (Figs. 7a–f).

Larva.—Length 7–8.5 mm. Frontoclypeus yellow-brown with an indistinct darker pattern as figured (Fig. 9). Antenna 4-segmented, segment 2 with a subapical pale band; throat cleft as figured (Fig. 10). Suboesophageal ganglion and integument in throat cleft pale. Submentum (Fig. 12) and tip of mandible (Fig. 13) as figured. Mouth brushes with about 40 to 44 filaments. Respiratory histoblast as figured (Fig. 11). Anal gills compound, each of the three divisions subdivided into 11 or 12 lobes. Twenty or more anal hooklets in each row. No ventral tubercles.

Pupa.—Length 4–5 mm. Head and thorax finely dark granulose. Head trichomes 3 on each side, simple; thoracic trichomes 3 on each side, bifurcate. Respiratory organ with 12 filaments arising from a smollen basal area, the six anterior filaments paired on short petioles, the six posterior filaments from a common, curved base as figured (Figs. 14–17). First tergite with 2 small spines in transverse row near each lateral margin; tergites 2–4 with 4 hooklets on each side on posterior margins; 5–7 bare; 8 with an irregular row of many fine teeth near anterior margin on each side; 9 with a pair of short, acute tail hooks. Sternite 5 with a pair of hooklets close together on each side on posterior margin; 6 and 7 each with 4 hooklets evenly spaced on posterior margin. Cocoon as figured (Fig. 17).

Holotype, female, Smith's Fork Creek at Lander Trail, 8.5 mi. from Smoot entrance, Lincoln Co., Wyoming, Aug. 11, 1956 (G. R. DeFoliart No. 252–6), pupal exuvium and cocoon mounted on slide. *Paratypes*: 2 males, 3 females, with pupal skins, same data; 26 females, 2 males, Libby Creek at Highway 130, 8,500 ft., Snowy Range, Albany Co., Wyoming, July 23, 1956 (DeFoliart No. 154), many pupal exuviae, some individually associated; 1 larva, 2 pupae, City Creek Canyon, Salt Lake City, Utah, June 22, 1952; 15 larvae, 18 pupae, same locality, July 2, 1952 (Peterson); 2 pupae, 1 male dissected from pupa, and 2 females, July 5, 1952; many pupae, July 6, 1952; 7 females, 2 males, Big Cottonwood Canyon at South Fork, Salt Lake City, Utah, July 27, 1956 (all Peterson); 14 larvae, 3 pupae, Marble Fork, Kaweah R., Sequoia National Park ,California, June 5, 1953 (R. W. Coleman). Additional ,non-paratypic larval and pupal material has been seen from the two Utah localities listed as well as the following. WASHINGTON: Blewett Pass, June 16, 1941; Cliffdell, June 15, 1944; Cedonia, June 11, 1944. MONTANA: Midville Creek, E. Glacier, August 29, 1953. CALIFORNIA: Sagehen Creek, Sierra Co., July 1953; Independence Creek, Inyo Co., 6,000 ft., August 2, 1952; Ten-mile Creek, Kings Canyon National Park, Fresno Co., June 5, 1953; East fork of the Carson R., S. of Markleeville, Alpine Co., June 22, 1948; West fork of the Carson R., 6.5 mi. west of Woodfords, Alpine Co., July 7, 1950; nr. Mohawk, Plumas Co., May 20, 1950; Swift Creek, 1.5 mi west of Trinity Center, Trinty Co., American R., El Dorado Co., July 9,

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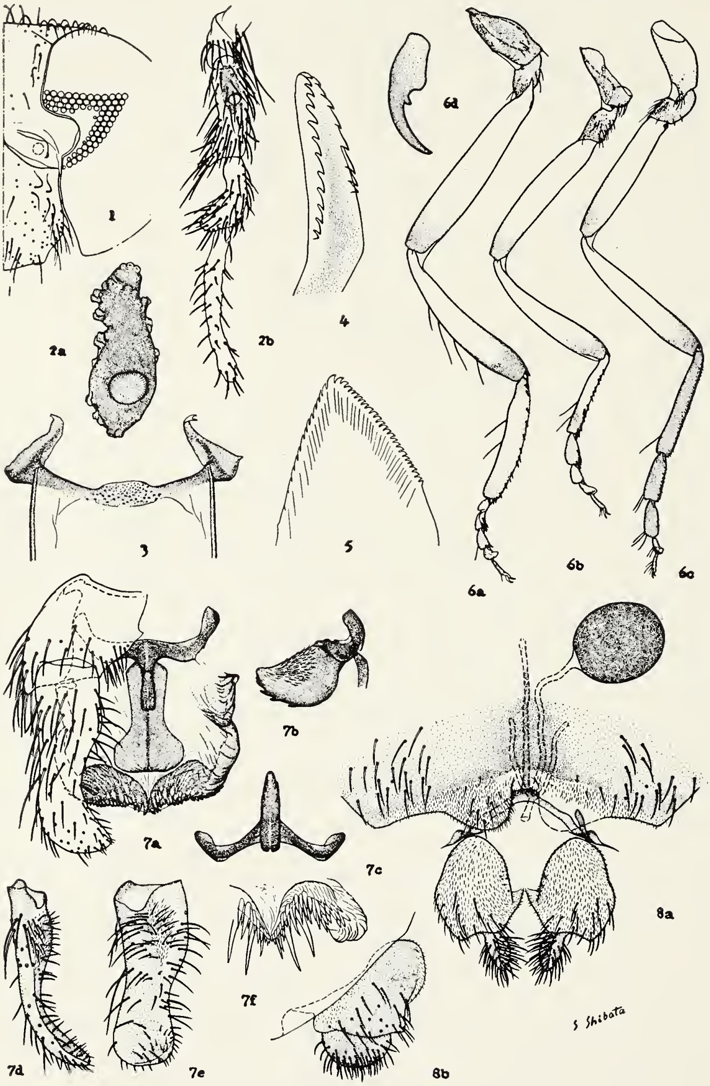
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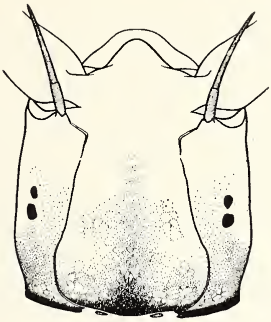
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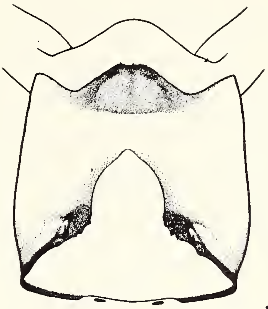
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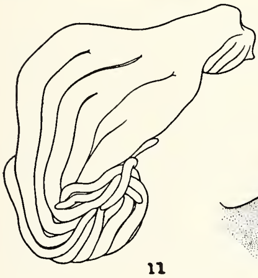
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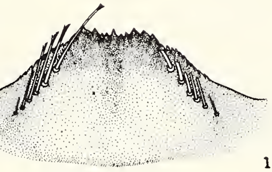
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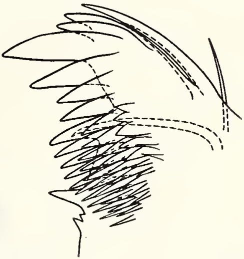
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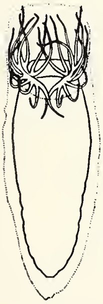
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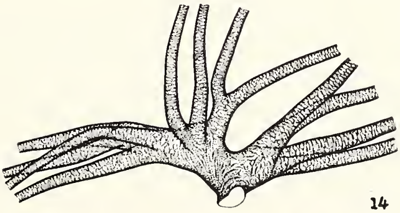
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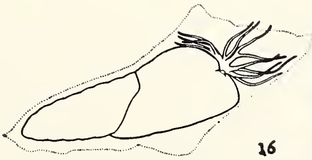
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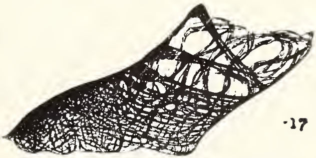
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S. Shibata

1950. Holotype and paratypes in the U. S. National Museum, Type No. 63961. Paratypes in collections of the University of Wyoming, University of Utah, and the Canadian National Collection.

This species is rather closely related to *S. arcticum* Malloch and to the species that have been referred to the genus *Gnus* Enderlein in the palaearctic Region (Rubtzov, 1956). We refrain from giving these species a subgeneric designation until the higher categories of the Simuliidae can be re-evaluated. *S. defoliarti* differs most notably from *arcticum* in the shape and arrangement of the respiratory filaments of the pupa. The female or *arcticum* can usually be differentiated by having darker mid and hind femora and by the entirely dark first flagellar segment. The male of *arcticum* also has the dark color of the legs more extensive. The larva of *arcticum* usually has a more strongly contrasting dark area on the posterior portion of the frontoclypeus, covering about half the area and somewhat narrowed anteriorly.

The senior author has compared *defoliarti* with the type female of *S. brevicercum* Knowlton and Rowe, and the type male of *S. nigresceum* Knowlton and Rowe, both in the U. S. National Museum, and considers it distinct. He believes that Stains and Knowlton (1943) were correct in synonymizing *brevicercum* and *nigresceum* under *arcticum* Malloch.

Biology.—This species has been collected in Utah at elevations from 4,500 to 7,500 feet. The larvae and pupae are generally found in rough, turbulent water with a current velocity between 3.3 and 5.5 feet per second, but have been taken in water flowing as slow as 0.82 foot per second. The immature stages seem to prefer shaded stream areas. The winter is passed in the egg stage, and the larvae appear in late May or early June. The adults reach their peak of emergence about the middle of July. There appears to be one or possibly two generations per year in Utah, as compared with three and four for *S. arcticum.* Adult females have been collected flying about people, but are not known to bite man.

LITERATURE CITED

Rubtzov, I. A. 1956. Black-flies (Simuliidae). Fauna SSSR (n.ser.n.64), Insects, Diptera, t.6, n.6 ed. 2, pp. 1–859.

Stains, G. S. and **Knowlton, G. F.** 1943. A taxonomic and distributional study of Simuliidae of western United States. Ann. Ent. Soc. Amer. 36: 259–280.

A SYNOPSIS OF THE SPECIES OF HOMALODISCA IN THE UNITED STATES (HOMOPTERA, CICADELLIDAE)

By David A. Young, Jr.,[1] Raleigh, North Carolina

Two species of *Homalodisca* are known to be of economic importance in the United States. One of these, by far the most common species in the genus in this country, has been called *triquetra* (F.) for many years. *Cicada triquetra* F. was originally described from South America, and its identity has recently been clarified by Schröder (1957), who illustrated the aedeagus of the male type. It is obvious from this work that true *triquetra* does not occur in the United States.

The present effort to clarify the status of our species was undertaken because of the economic importance of this group. A separate study of the U.S. species of the subfamily Tettigellinae and the genera of the subfamily for the world has been in progress for some time. These have not reached the publication stage at this time, and for this reason a redescription of the genus, and a discussion of generic relationships form no part of the present undertaking. The reader is referred to Oman (1949) for the most recent discussion of these features.

There are four species of *Homalodisca* in this country. One is common and widespread, two have a fairly limited distribution, and one apparently has extended its range from Southwestern to Southeastern United States in a decade.

Key to U. S. Species of Homalodisca

1. Forewing with anterior portion transparent 2
   Forewing with anterior portion opaque 3
2. Length of male 10.8–13.0 mm., of female 12.3–13.8 mm.; head with crown tan sprinkled with white flecks; male with aedeagus having two pairs of well-developed processes (Plate I, Figs. C, E, F, G) .... *coagulata* (Say)
   Length of male 8.5–10.2 mm., of female 10.0–11.2 mm.; head with white markings of crown occurring in sinuous lines, not in disconnected flecks; male with aedeagus having one

---

[1] Contribution from the Entomology Department, North Carolina Agricultural Experiment Station, Raleigh, North Carolina. Published with the approval of the Director of Research as Paper No. 829 of the Journal Series.

of the two pairs of processes greatly reduced (Plate II, Figs. A, C, E, F) .... *liturata* Ball

3. Thoracic pleura with a conspicuous cream-colored longitudinal line; pronotum relatively flattened; female seventh sternum with hind margin deeply and narrowly excavated medially; male plates exceeded by pygofer by a distance about equal to their length, aedeagus without anteapical processes. *insolita* (Walker)

Thoracic pleura without such a line; pronotum strongly convex; female seventh sternum with hind margin shallowly emarginate, slightly produced medially; male plates exceeded by pygofer by a distance greater than their length, aedeagus with a pair of anteapical processes (Plate II, Fig. M). *elongata* Ball

Homalodisca coagulata (Say)
(Plate I)

Tettigonia coagulata Say, 1832. New species of North American insects: 13.

Homalodisca triquetra; American authors, not Say.

Length of male 10.8–13.0 mm., of female 12.3–13.8 mm. Crown with median length approximately equal to interocular width and from six- to seven-tenths transocular width. Female seventh sternum with hind margin deeply excavate, the emagination variable in form, from V- to broadly U-shaped. Male pygofer with posterior lobe large, pygofer process obsolescent, on basal half of pygofer; aedeagus having two pairs of processes, the innermost pair lanceolate and directed dorsad, caudodorsad, or caudad; the outer almost always arched, their apices usually sagittate with minutely serrate edges and directed caudad.

Crown and pronotum usually brown, occasionally partly black, with numerous flecks of yellow or white. Scutellum brown with weak yellow spots. Forewing membranous except a C-shaped area beginning slightly behind the R-M fork, extending to the costal margin, thence apicad for a short distance, thence mesad through the outer and middle anteapical cells, and a spot in the basal portion of the inner anteapical cell, which are coriaceous and red to purple in color; veins red to purple. Face amber with transverse muscle impressions, a median spot at transclypeal sulcus, and a pair of spots above the latter, darkened. Abdomen black with a triangular conspicuous pale area, broadest near base of abdomen, on each side.

This is the species which North American authors have called *triquetra* (F.) for many years. Schröder's work, mentioned in the introductory paragraphs above, pointed out the error in this. Schröder, however, synonymized *coagulata* with a species from "Southern North America" and Central America, which he interpreted as *H. vitripennis* (Germar). I have examined a number of specimens from the United States, and have not found *vitripennis* (Germar) *sens.* Schröder. Since Say described *coagulata* from Louisiana, a correct interpretation of this species will not include the range in which *vitripennis* (Germar) *sens.* Schröder occurs (I have seen the latter only from Costa Rica, El Salvador and Honduras, to date). The species described and illustrated here is common in the territory Say knew as "Louisiana," and there seems to be no other species to which the name can logically be applied. It is hoped that this application of the Say name will result in stabilization of the name of this important economic species. It is one of the vectors of phony peach disease in the southern United States.

H. coagulata has been taken in South Carolina, Georgia, Florida, Alabama, Mississippi, Texas, Missouri, Louisiana, and Wisconsin. I have also examined specimens from the U. S. National Museum labeled simply "Mex." Probably the latter were taken in northern Mexico.

Homalodisca liturata Ball
(Plate II, A–E)

Homalodisca liturata Ball, 1901. Proc. Iowa Ac. Sci. (5) 21: 48.

Length of male 8.5–10.2 mm., of female 10.0–11.2 mm. Crown with median length approximately equal to interocular width and from two-thirds to three-fourths transocular width. Female seventh sternum as in *coagulata*. Male pygofer with posterior lobe large, pygofer process minute, on basal half of pygofer; aedeagus similar in form to *coagulata* but with the outer pair of processes greatly reduced, the degree of reduction somewhat variable, these processes almost completely wanting in some specimens.

Crown, pronotum and scutellum mottled yellow and black, the markings of the crown usually occurring in sinuous lines. Other markings as in *coagulata*.

This species is very closely related to *H. coagulata* from which it can usually be distginuished by the linear markings of the crown. *H. liturata* is also smaller than *coagulata*, and the reduced inner pair of processes of the aedeagus, which are not arcuate, will distinguish it from the latter.

Specimens have been examined from Arizona, California, and the states of Sonora and Sinaloa in Mexico.

Homalodisca insolita (Walker)
(Plate II, H–K)

Proconia insolita Walker, 1858. List Homop. Ins. Brit. Mus.: 227.

Length of male 9.0–10.0 mm., of female 11.0–12.3 mm. Crown with median length equal to interocular width, and slightly less than two-thirds transocular width. Female seventh sternum with hind margin very deeply, very narrowly notched medially. Pronotum flatter than usual in the genus. Male pygofer with posterior lobe not differentiated from remainder of pygofer; pygofer process prominent, on posterior half of pygofer, directed cephalomesad; aedeagus with an apical group of processes arranged like a fringe, without more basal processes.

Crown and anterior portion of pronotum black irrorate with yellowish white. Scutellum dark brown to black, obscurely marked with pale dots. Disc of pronotum and forewing brown, the latter coriaceous and punctulate in outer claval cell and in region basad of anteapical cells. Face yellow to amber, with a few of the transverse muscle impressions and a spot on the gena opposite these black on each side, without dark markings in region of transclypeal sulcus. Lateral portions of thorax and abdomen with a continuous longitudinal yellow stripe which is bordered ventrally on the thoracic pleura and dorsally along the side of the abdomen with black.

This species can be readily separated from the others by its conspicuous yellow lateral line, the less convex pronotum, the deep, very narrow notch of the female seventh sternum, and the lack of aedeagal processes basad of the apical fringe.

H. insolita appears to have made its way from the Brownsville, Texas region into southeastern United States in the last decade. Its discovery in the latter region is credited to the work of Dr. William F. Turner and his colleagues of the Fruit Insects Section of the Entomology Research Division of the U. S. Department of Agriculture. Dr. Turner has a paper in press with additional information on the distribution of this species, and its significance in the transmission of phony peach disease. The writer has collected specimens in southern North Carolina on Johnson Grass.

Homalodisca elongata Ball
(Plate II, L–O)

Homalodisca elongata Ball, 1936. Proc. Biol. Soc. Wash. 49: 17.

Length of male 10.0–11.0 mm., of female 11.0 mm. Crown with median length slightly greater than interocular width and approximately two-thirds transocular width. Pronotum strongly convex. Female seventh sternum with hind margin shallowly emarginate, the emargination very broadly U-shaped. Male pygofer with posterior lobe large, pygofer process short, distinct, occurring at about midlength of pygofer, directed caudad; aedeagus with a single pair of short processes located on ventral margin of aedeagus at base of aedeagal shaft which is curved more strongly caudad at its apex than in any of the other species in the United States.

Crown with ground color ivory occasionally suffused with pale gray or amber; the basal half of the median line, a longitudinal line on each side of the median line in apical half, the dorsal muscle impressions, the dorsal portion of the lateral clypeal sulci, the margins of the antennal ledges, and a pair of angulate vittae near basal margin, black. Pronotum with submarginal area near anterior margin ivory irregularly marked in heavy black; remainder with ground color grayish brown with conspicuous transverse ivory rugae. Scutellum black with irregular yellow markings. Forewing opaque, venation distinct, the cells smoky-black to purple. Face ivory to amber, clypeus irregularly marked with black, but with markings arranged to delimit weakly a transverse interocular pale stripe below apex of crown. Thoracic pleura pale yellow. Abdomen with a pale lateral stripe which is not broadened near base.

Specimens of this species have been examined from a number of Arizona localities. It is not known from any other state.

Literature Cited

Oman, P. W. 1949. The Nearctic leafhoppers, a generic classification and check list. Ent. Soc. Wash. Mem. No. 3, 253 pp.

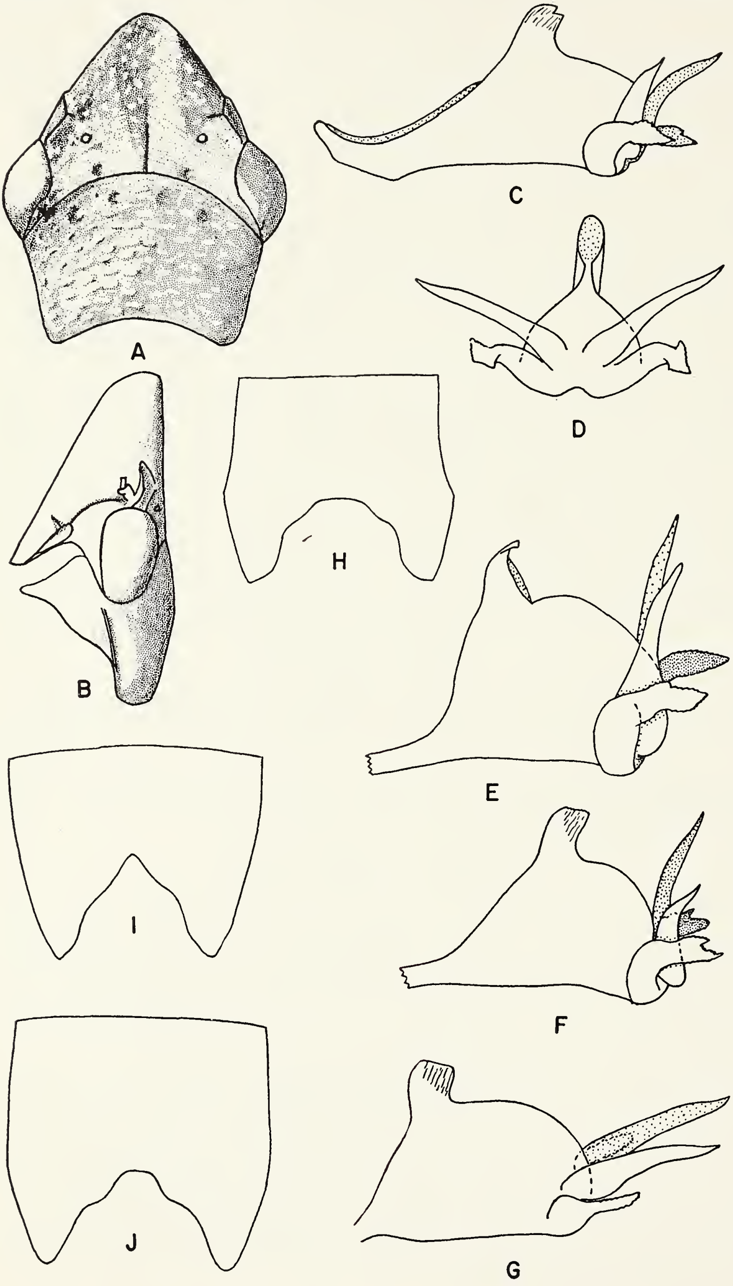
Schröder, H. 1957. Neues zur Gattung *Homalodisca.* Senckenbergiana Biologica 38: 251–258.

Explanation of Plates

Plate I. *Homalodisca coagulata* (Say). A. Head and pronotum, dorsal aspect. B. Same, lateral aspect. C, E, F, G. Aedeagus, lateral aspect showing individual variations. D. Aedeagus, caudal aspect (same specimen as C). H, I, J. Seventh sternum of female, showing individual variations.

Plate II. *Homalodisca liturata* Ball. A, C, E, F. Aedeagus, lateral aspect, showing individual variations. B, D, G. Aedeagus, caudal aspect, showing individual variations. H–K. *H. insolita* (Walker). H. Aedeagus, lateral aspect. I. Same, caudal aspect. J. Female seventh sternum. K. Left side of male pygofer, ventral aspect. L–O. *H. elongata* Ball. L. Aedeagus, ventral aspect. M. Same, lateral aspect. N. Left side of male pygofer, ventral aspect. O. Female seventh sternum.

YOUNG PLATE I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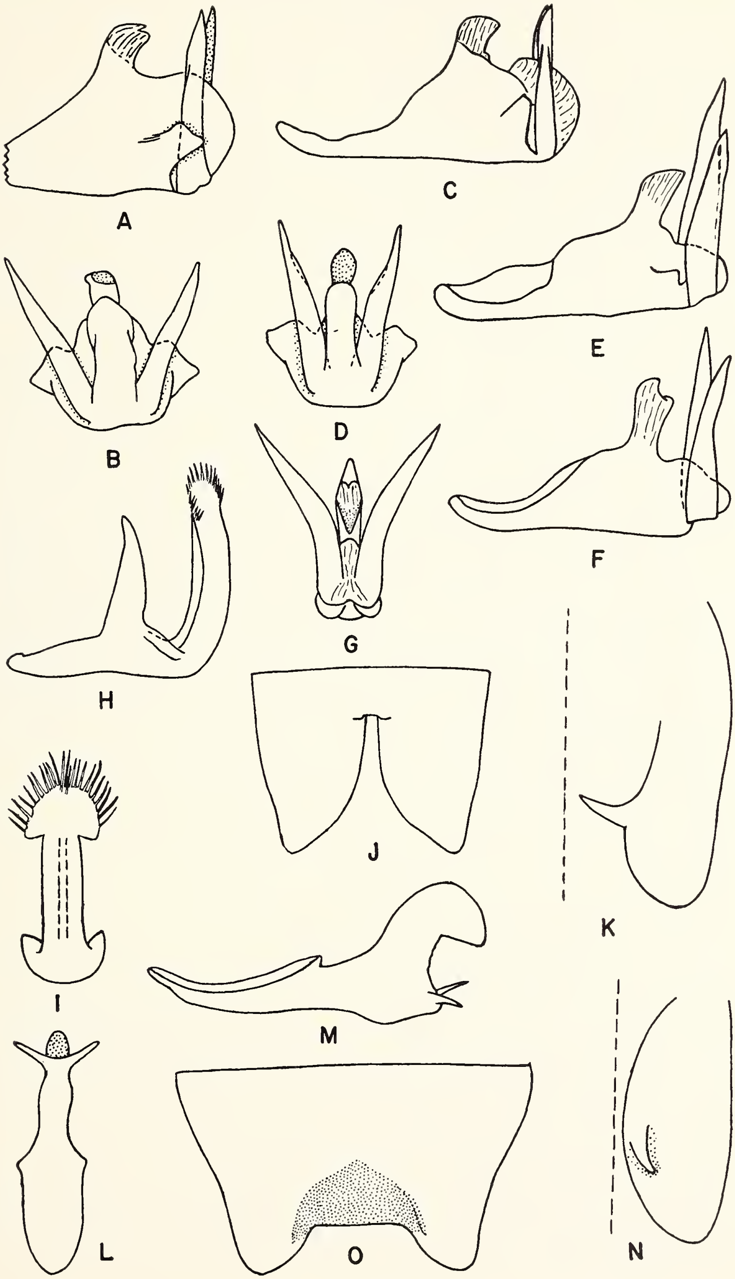
YOUNG PLATE II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A CRITIQUE OF WHOLESALE AERIAL SPRAYING OF DDT

By Theodore Dashman*

During May and June, 1957, federal and state authorities authorized the spraying of better than two million acres with DDT against the gypsy moth in a region consisting of New York, New Jersey and Pennsylvania. This action has not only brought editorial comment by New York newspapers, but court action in a federal court. This kind of response was not peculiar to the area mentioned, but occurred also in the South when, in the winter of 1958, dieldren was used to control the imported fire ant.

When the functions of a government agency precipitate a legal dispute, we tend to scrutinize the motives very carefully. In this case, the political, social and biological aspects require examination.** Many individuals, like Dr. R. C. Murphy, have the opinion that government authorities acted irresponsibly by intruding on private property, by possibly exceeding the legal minimum dose of DDT on agricultural produce, and by disregarding wildlife. Yet, when state or federal governments discontinued eradication measures against a particular pest, the insect had an opportunity to reestablish itself over a wider geographical area and inflict great damage. Reestablishment of containment or eradication measures presented more problems than if the original programs had been maintained (Popham and Hall).

The question of intrusion on private property involves nuances of law that are beyond the scope of this discussion. However, we shall explore several aspects of wholesale aerial spraying, such as ecological effects, toxicological potential and resistance to insecticides.

Toxicity

When poisons are disseminated over large land areas, the fear of injury to individuals becomes paramount. Not only may man suffer, but other animals as well. The following summary of the effect of DDT on various species is an attempt to dispel the anxieties aroused with regard to the insecticide as a dangerous toxin to the several groups of vertebrates and invertebrates. Although

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* 504 Cathedral Parkway, New York 25, N. Y.

** A relevant article on this subject has recently appeared (Jacob, E. H. 1958. Some modern problems in pest control. Sci. Prog. 181: 30–45).

plants may be adversely affected by DDT, we are not including a discussion of their reactions to DDT.

Man. The Committee on Pesticides of the American Medical Association suggests that about 500 mg./kg. may be a human lethal dose, and 50 mg./kg., or one-tenth the oral dose, taken intravenously is toxic. The World Health Organization regards ingestion via food of 0.5 mg. DDT per kg. of body weight of man as a safe limit. Drinking water, however, should be free of DDT, although 0.1 ppm. can be tolerated. Conley reported that between the years 1946 and 1954 only 6–10% of accidental deaths caused by pesticides were caused by DDT.

Man rarely ingests more than 2.6×10^{-3} mg./kg. of body weight per day of DDT in his meals. DDT, therefore, is certainly not as toxic as the older, popular insecticides like arsenate, fluoride, or nicotine. In a recent experiment where humans volunterred as subjects Hayes *et al* studied the effects of repeated oral doses of DDT (2,2-bis-(p-chlorophenyl)-1,1,1 trichloroethane). He analyzed urine and body fat for DDT and its by-products, DDE and DDA. Fat was obtained by biopsy. Each subject received a dose about 200 times greater than the dose of the general population (2.6×10^{-3} mg./kg./day) and fiive times less than the dosage that can cause mild sickness. They found that DDA (bis(-p-chlorophenyl)acetic acid) was excreted and DDT stored in the fat in amounts proportional to the dosage of DDT administered. It was possible to account for 20% of the administered DDT by analysis for DDA. The subjects were able to achieve a storage equilibrium of DDE (2,2-bis-(p-chlorophenyl)-1,1 dichloroethane). With increased administration of DDT, the DDE storage equilibrium falls off.

While milk for human consumption cannot by law contain DDT or other pesticide residues, contamination still occurs. In a survey of milk samples collected from points all over the United States, Clifford found contamination in 62% of the samples: however, concentrations were considerably less than the recognized dangerous dose. DDE was often noticed, but this could be due to storage, transporation or a metabolite of DDT. DDD, which is not considered a DDT metabolite, was also found; this may be an impurity in the original DDT solution. A follow-up survey in 1956–57 revealed little or no contamination of milk with DDT.

DDT presently in use does not constitute a danger to the health of man.

Mammals. Mammals are not directly affected by usual doses of DDT used for insect control, but they may leave a community due to lack of a dietary staple. For example, raccoons were secondarily affected when DDT destroyed the crayfish, the staple in their diet. Aerial spray is not as critical as ground application, since the forest canopy screens out much of the solution as it descends.

Birds. In general, large doses of DDT, i.e., 5 lbs. or more per acre, will have a toxic effect. Doses of 2 or 3 pounds per acre may injure immature birds and eliminate much of the insect food supply. For applications at 1 lb. per acre, direct effects on birds are negligible; however, the insect food population may be greatly reduced, thereby producing a secondary causal factor for the reduction of bird populations (Rudd and Genelly). In experiments where quail and pheasant were fed 100 and 50 ppm. of DDT respectively, the adults survived but the chicks showed a high mortality (De Witt). Nestling birds, eggs and nests of songbirds sprayed with DDT oil solutions were not injured, but the eating of insects contaminated with DDT did cause high mortality. Hanson studied the effects of spraying 10 acres of North Dakota with 1.5 lb./acre of DDT. The area sprayed contained a pothole in which ducks lived. After spraying, more than 95% of the insects were killed. As the pothole receded the birds fed on the dead insects, but the birds showed no signs of poisoning.

Amphibians and Reptiles. Amphibians and reptiles that leave their usual shallow, aquatic confines are not apt to be harmed by DDT sprays. It is when the water is covered with an oily film, or when they eat DDT-killed animals that they are more prone to danger (Rudd and Genelly). Snakes tend to keep themselves very well concealed; therefore direct observation of their ability to tolerate DDT is difficult. There have been some casualties due to spraying, but few compared with the total population.

Fish. Small amounts of DDT are sufficient to kill fish. Burden used about .09 ppm. of DDT to control the chironomid *Tanytarsus lewsii* and found many fish killed by DDT. Using the Schechter-Haller technique for DDT analysis, he found a correlation between fat content of tissue and survival of fish. More DDT was found in the visceral fat, than the gill fat, than the flesh fat, in three species of fish.

Invertebrates other than Insects. Groups like Annelida and Mollusca do not seem to be too affected by DDT. Spiders living in webs are more susceptible to DDT than the more sheltered species. Other groups, like Nematoda, Pauropoda, Diplopoda, Chilopoda and Symphyla were not affected by DDT from aerial sprays (Hoffman *et al*). Crustaceans (Springer and Webster) living in salt marshes subject to mosquito control suffer high mortality.

Insects. Many insects are naturally resistant to DDT and the susceptible strains may often become resistant. More will be mentioned about DDT and resistance in other sections of this paper.

RESISTANCE

It is not our purpose here to review the investigations of the genetic, biochemical and biological factors affecting resistance. The majority of investigators do not believe that the insecticide is a mutagenic agent, i.e., causes a chemical reaction in the insect between the poison and organism to produce resistance. Most entomologists argue that differences in resistance are already present in the insect population and the insecticide acts as selector—selective agent. For further discussion on preadaptation or post-adaptation of resistance, see Crow and Gibson.

It is widely known that a species can strengthen its tolerance to an insecticide when the insecticide is applied in greater and greater doses. From a practical standpoint, then, do we benefit from aerial application? Will not the resistance of those insects already resistant increase, and/or will we not obtain the first phenotypic resistant response to the insecticide?

In general, spraying of extensive areas that include the public domain has been over forest areas for the control of forest pests, rather than over plantations or ranches for the control of orchard, grain, vegetable, cotton or cattle pests, since other eradicating measures can be employed. Containing or eradicating a pest, within the limits of its heaviest infestation, has been accomplished by aircraft. The best time for application is about the stage of the life cycle of the injurious insect when it is most susceptible to the toxin.

For spraying forest areas, the best results are obtained with fine particles; however 100% impingement can hardly be obtained in forest spraying. Hoffman *et al* present data showing, from an aerial spray of DDT of 1 lb./acre, deposits averaging .05 lb./acre beneath the canopy, an average of .6 lb. in open sites and an average of .36 lb./acre ranging from .06 lb. to 1 lb. on island platforms in streams.

In order for an insect to build up resistance to an insecticide, for example the house fly, it would be necessary to apply a sublethal dose at each succeeding generation. However, intermittent, wholesale spraying for the control of forest pests, such as the gypsy moth, is not likely to enhance resistance. The principle of mass spraying is to reduce the population of a pest in one fell swoop, making repeated applications unnecessary. Between one application and the next, sufficient generations would have elapsed so that any initial resistance response to the insecticide would have been negated.

While the use of more than one insecticide at a time introduces problems of synergism and/or multiple resistance, we can safely conclude that occasional, aerial spraying of a single insecticide over large tracts of land for a specific pest will not magnify the question of resistance.

Balance of Nature

We can not agree that aerial spraying of DDT would not produce adverse conditions in treated areas. The question is: does the application of DDT over a wide area produce *irreversible* conditions? A categorical reply one way or another would not be realistic. But the few investigators who have studied the ecological disturbances caused by DDT spray claim that there is, as yet, no real evidence of a permanent imbalance of nature. The examples of the creation of new primary pests or the permanent increase of an already established pest have been in those places that received repetitious or heavy applications of DDT. Large areas subjected to a single treatment usually recovered a short while thereafter.

Applications of 4 lb./acre (Gerhardt) may be more detrimental than beneficial by reducing natural predators and parasites simultaneously with the pest. Hoffman *et al* say that applications of 5 lb./acre threaten extermination of many species and encourage aphid and mite outbreaks; however, use of 1 lb./acre produces no marked change in the fauna. The available data show that there is good reestablishment of harmless insects and other terrestrial animals temporarily affected by DDT. Insects used as fish food can be reduced to levels that make it difficult for fish to find sufficient food, yet rapid repopulation of insects in treated waters minimizes the loss of fish food.

The destruction of a pest population does not mean that any entomophagous insect for which it is a host will also be eliminated. True, many parasites and predators are host specific, but by the same token many have several hosts. For example, the carabid *Calosoma sycophanta* L, predator of the gypsy moth, partakes of several other species, and the tachinid parasite *Compsilura consinnata* (Mieg) inserts its young into a hundred other caterpillars besides *Porthetria dispar* L., (Clausen). So long as the beneficial insect species can maintain its integrity on or in several different hosts, the balance of nature does not seem to be affected.

Let us recall that the parasite and predator cannot make their effectiveness felt until the host has established itself, hence we can assume that there would be some degree of damage by the economically important species before it is destroyed by natural forces. A novel approach to this host-parasite relationship is Ripper's selective spraying hypothesis, namely, to maintain the entomophagous population while simultaneously controlling the "pest or potential pest" population.

Man has been considered an important part of the biota whose gross activities have been an *"interference"* (Ullyett) with balance of nature. In the same vein, then, i.e., man as a competing species, he is obeying a fundamental biological hypothesis: survival of the fittest. *Homo sapiens* has the same requirements for self preservation as other species, therefore man will attempt to protect himself from competing species, insect pests, for instance. By the same token, he will protect those groups which are beneficial.

Conclusion

We have surveyed, on the basis of the available evidence, three aspects of mass aerial spraying of DDT. The toxic hazard appears to be negligible; the effect on insect resistance is minimal; and the consequences to the balance of nature are far from alarming. We can safely conclude, therefore, that the controlled application of DDT by mass aerial spraying presents no real danger.

Literature Cited

Burden, E. H. W. J. 1956. Case of DDT poisoning in fish. Nat. 178: 546–547.

Clausen, C. P. 1940. Entomophagous insects. McGraw Hill, New York.

Clifford, P. A. 1957. Pesticide residues in fluid market milk. Pub. Hlth. Rep. 72: 729–734.

Conley, B. E. 1957. Incidence of injury with pesticides. J. Amer. Med. Assoc. 163: 1338–1346.

Crow, J. F. 1957. Genetics of insect resistance to chemicals. Ann. Rev. Ent. 2: 227–246.

De Witt, J. B. 1956. Chronic toxicity to quail and pheasant of some chlorinated insecticides. J. Ag. Food Chem. 4: 863–866.

Editorial 1955. Chlorophenothane (DDT) a blessing or a menace. J. Amer. Med. Assoc. 158: 1370–1371.

Gerhardt, R. W. 1955. Effect of an insecticide treatment on some natural invertebrate predators in rice fields. Proc. Ann. Conf. Calif. Mosq. Cont. Assoc. and Ann. Meeting Amer. Mosq. Cont. Assoc., pp. 124–125.

Gibson, I. G. and F. Gibson. 1951. Development of resistance to dihydrostreptomycin by *Bacterium coli.* Nat. 167: 113–114.

Hanson, W. P. 1952. Effects of some herbicides and insecticides on biota of North Dakota. J. Wildlife Manag. 16: 299–308.

Hayes, W. J., W. F. Durham, and C. Cueto, Jr. 1956. The effect of known repeated oral doses of chlorphenanthrone (DDT). J. Amer. Med. Assoc. 162: 890–897.

Hoffman, C. H., H. K. Townes, H. H. Swift and R. I. Sacter. 1949. Field studies on the effects of airplane applications of DDT on forest invertebrates. Ecol. Monogr. 19: 1–46.

Hoffman, C. H. and A. T. Drooz. 1953. Effects of a C-47 airplane application of DDT on fish food organisms in two Pennsylvania watersheds. Amer. Midl. Nat. 50: 172–188.

Murphy, R. C. Private communication.

Popham, W. L. and D. G. Hall. 1958. Insect eradication programs. Ann. Rev. Ent. 3: 335–354.

Ripper, W. E. 1956. Effect of pesticides on balance of arthropod populations. Ann. Rev. Ent. 1: 403–438.

Rudd, R. L. and R. E. Genelly. 1956. Pesticides: their use and toxicity in relation to wildlife. Game Bul. of State of Calif., Dept. of Fish & Game.

Springer, P. F. and J. R. Webster. 1951. Biological effects of DDT applications on tidal salt marshes. Mosq. News 11: 67–74.

Ullyett, G. C. 1951. Insects, man and the environment. J. Econ. Ent. 44: 459–464.

CHANGE IN EDITORSHIP OF ENTOMOLOGICA AMERICANA

Effective with the 1958 volume, Dr. James A Slater has assumed the editorship of **Entomologica Americana.** All communications pertaining to manuscripts should be addressed to him at the Department of Zoology and Entomology, University of Connecticut, Storrs, Connecticut.

DESCRIPTIONS OF SEVERAL SPECIES OF TRICHOPTERA.

By Oliver S. Flint, Jr., Ithaca, N. Y.[1]

Examination of several collections of caddis flies has yielded two new species from the eastern states, plus additional material of a western species. I wish to express my appreciation to Dr. J. G. Franclemont for making his extensive collections available, to Dr. D. G. Denning and Dr. H. H. Ross for examining material, and to the Grace Griswold Fund for assuming the expense of engraving the plate.

Rhyacophila shenandoahensis, n. sp.

The species is a member of the *invaria* group, very closely related to *banksi* and *parantra.* It differs in the male in the apical process of the ninth tergite which is cleft nearly to the base and in the dorsal aspect of the anal sclerite.

Male: Length of fore wing 7–8 mm. Color deep brown in alcoholic material, nearly black when alive.

Genitalia as in Fig. 1. Ninth segment annular, slightly narrowed ventrally, with the dorso-medial process divided nearly to base. Tenth tergite low with small dorsal lobes and blunt posterior point. Anal sclerite dorsally with prominent lateral angles. Claspers with short quadrate basal segment; apical segment deeply divided, dorsal lobe about half length of ventral. Aedeagus identical to related species.

Female: Color and size similar to male. Eighth segment with ventral tongue divided about third its length; lateral margin with sharp tooth; dorsal margin shallowly emarginate.

Holotype male and *allotype* female, White Oak Canyon Trail, Shenandoah National Park, Virginia, June 21, 1955, O. S. Flint, Jr.: deposited in U. S. National Museum. *Paratopotypes,* 5 males: deposited in collections of Illinois Natural History Survey, Cornell University, and author.

Figures of the dorsal aspect of the anal sclerite of *parantra* (Fig. 2) and *banksi* (Fig. 3) are added to facilitate comparison. The specimens were collected along a small stream near its source in several springs near the Skyline Drive.

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[1] Department of Entomology and Limnology, Cornell University.

Lepidostoma carrolli, n. sp.

This species belongs to the *unicolor* group, closest to *knulli* and *strophis,* but can be separated by the genitalia of the male, in particular the tenth tergite which is widely separated on the meson, and the claspers.

Male: Length of fore wing 5–6 mm. Color of alcoholic specimens light brown. Maxillary palpi apparently one-segmented, nearly round and rugose. Legs, antennae, and wings without sexual modifications.

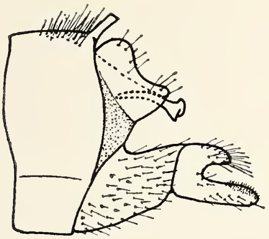
Genitalia as in Fig. 4. Ninth segment annular, rather short, with small sparse setal patches dorsally. Tenth tergites triangular in lateral view with several small teeth ventrally; dorsally narrow, and widely separated on meson by membranous flap. Claspers short with tip bifid and angled mesad; basal process narrow, subequal in length to claspers; dorsal process arising near base of basal process, with several small teeth internally near apex.

Female: Similar in size and color to male. Ninth tergite produced posteriorly into a blunt angle, and bearing a pair of small setal warts. Tenth tergites extending outwardly as a pair of rounded flaps, each with a narrow posterior ridge. Spermatheca with ventral bridge basal, rounding evenly to sides of spermatheca.

Holotype male, Lakehurst, New Jersey, September 4, 1956, C. B. Knowlton, Jr., and J. G. Franclemont; *allotopotype* female, September 1, 1956; deposited in Cornell University collection. *Paratopotypes:* Aug. 25, 1 male; Aug. 26, 4 males; Aug. 30, 1 male, 1 female; Sept. 1, 1 male; deposited in collections of U. S. National Museum, Illinois Natural History Survey, Dr. D. G. Denning, and author.

EXPLANATION OF PLATE

Fig. 1. *Rhyacophila shenandoahensis:* A. Male genitalia, lateral. B. Male, ninth tergite, dorsal. C. Male, anal sclerite, dorsal. D. Female, eighth segment, lateral. Fig. 2. *Rhyacophila parantra,* anal sclerite, dorsal. Fig. 3. *Rhyacophila banksi,* anal sclerite, dorsal. Fig. 4. *Lepidostoma carrolli:* A. Male genitalia, lateral. B. Male, clasper, dorsal. C. Male, tenth tergite, dorsal of holotype. D. Same of paratype. E. Female, spermatheca, ventral. F. Female, ninth and tenth tergites, dorsal. Fig. 5. *Chimarra elia:* A. Male, apex of aedeagus, lateral. B. Same, ventral, with ventral process moved to side.



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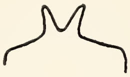

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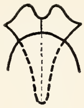

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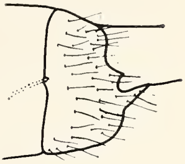

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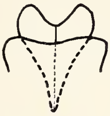

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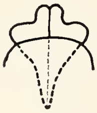

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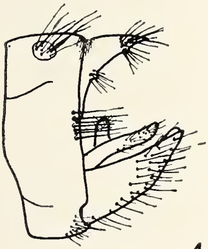

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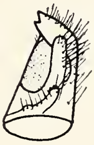
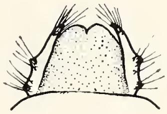
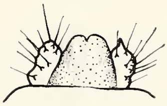


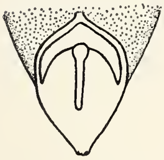
4B



4C



4D



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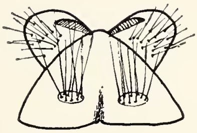

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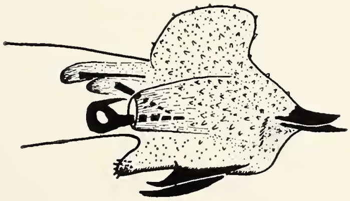
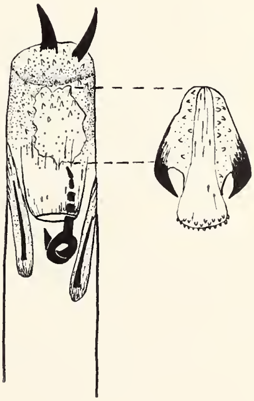


5A



5B

There is variation in the shape of the tenth tergites between a pointed type (Fig. 4C) and a rounded type (Fig. 4D), one specimen even having one side rounded, the other side pointed. One male paratype has the claspers bent sharply mesad near the middle. The series was collected at a light overlooking an abandoned cranberry bog and stream on Wranglebrook Rd., about three miles from Lakehurst.

I take great pleasure in naming the species for its co-collector, Mr. Carroll B. Knowlton, Jr.

Chimarra elia Ross

This species was described in 1944 by Dr. Ross from a male collected in Brackettville, Texas. In 1955 the author collected a male near Alamos, Sonora, Mexico. Dr. Ross found upon comparison of these two specimens that the apex of the aedeagus of the type was lost, and urged that this structure be described.

Aedeagus (Fig. 5): Apex with 2 sharp spines. Ventral process with a central, slightly sclerotized, tongue-like strap and two lateral recurved hooks. Internally with 2 basal spines (possibly eversible), and ring-like central structure bearing a long projection from the ventral side which lies in a slightly sclerotized tube (this whole apparatus can probably be extended out the apex). Membranous surfaces covered with small spicules.

PUBLICATION ANNOUNCEMENT

The Proceedings of the Tenth International Congress of Entomology, held in Montreal, Canada, in August, 1956, are expected to be ready for distribution in late 1958. They will contain nearly 700 scientific contributions, many accompanied by illustrations. The four volumes, comprising over 4200 pages, will constitute an indispensable work of reference for many years since most of the material is not being published elsewhere. For further information write to: Tenth International Congress of Entomology, Science Service Building, Ottawa, Canada.

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BULLETIN
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Vol. LIII APRIL, 1958 No. 2

THE MAXILLA AND LABIUM OF THE LARVA OF ANOPHELES QUADRIMACULATUS SAY[1]

By James H. Menees[2]

The mouthparts of larval Diptera have always been difficult for the morphologist and taxonomist to interpret, and although numerous considerations have been given no investigator as yet appears to have explained them correctly. The following investigation, which is the first of two parts of a critical inquiry into the complex structure and formation of the larval mouthparts of the mosquito *Anopheles quadrimaculatus* Say, concerns the maxilla and labium. The second part of this inquiry, to be published later, will concern the labrum, the so-called premandibles, and the mandibles.

In order to understand the complex structure of the larval mouthparts of the Diptera, one has to consider the many theoretical, functional and evolutionary inter-relationships of insect mouthparts and how the dynamics of evolution may have produced such modified and reduced mouthparts. In considering the numerous implied points which the above inter-relationships give, the investigator will undoubtedly acquire and maintain a keen perspective into the dimensions of change in structure, form, and function which may accompany mouthparts throughout space and time. Furthermore, to comprehend the form and structure of the mouthparts of any insect, and especially a member of the Diptera, it is necessary to study not only the anatomy of the postembryonic mouthparts but also to study the embryonic development of the gnathal segments.

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[1] The Griswold Fund is acknowledged for payment of plates.

[2] Dept. Entomology & Limnology, Cornell University, Ithaca, N. Y.

Embryological studies for this investigation were made from eggs whose endo- and exochorions had been cleared and softened in 2.5% clorox (which is a 4.5% solution of sodium hypochlorite) and dissected away from the embryo. Delafield's hematoxylin was used to stain whole embryos and sagittal sections of embryos 5 microns thick. Larval mouthpart studies were done on larvae reared in the laboratory. Dissections were made with microdissecting instruments and a mercury arc lamp was used for maximum illumination.

No detailed observations seem to have been made on the embryonic development of the mouthparts of mosquitoes, not even in the works on the general embryology of mosquitoes by Franco and Arnold (1953) on *Aedes nigromaculis* (Ludlow) and by DeCoursey and Webster (1952) on *Aedes sollicitans* (Walker).

Recent workers who have given interpretations for the larval mouthparts of mosquitoes and related Diptera include Shalaby (1957, 1956), Schremmer (1950, 1949), Farnsworth (1947), Cook (1944), and Becker (1938).

Older workers who have given interpretations include Crampton (1930), de Meijere (1916), Imms (1907, 1908), Holmgren (1904a, 1904b), Johannsen (1903, 1905, 1934), Kellog (1902), Raschke (1887), Meinert (1886), and Weismann (1864).

EMBRYONIC DEVELOPMENT OF THE MAXILLA AND LABIUM.

In an early embryo in which segmentation has just begun (Fig. 1) segments are apparent as a series of transverse, circular ridges separated by intersegmental lines. The headlobes (hdlb), on which the antennae will form, lie at an angle to the stomodaeum (stom). The fused labral lobes, which appear to be formed in the anterior trunk segment immediately posterior to the stomodaeum (Butt, 1957), lie above the stomodaeum. The mandibular (md), maxillary (mx), and labial (lab) segments are also becoming differentiated.

As segmentation proceeds posteriorly to include the mesothorax (Fig. 2) the antennae (ant) begin to assume a definite form. The labral lobe is more dorsal and is concave in shape, while the mandibular, maxillary, and labial segments are conspicuous as transverse swellings divided along the median ventral axis by the neural groove (nrg).

The labrum becomes round as segmentation proceeds to the third abdominal segment (Fig. 3) and the antennae appear more dorsal to the forming mouthparts. The mandibular, maxillary, and labial segments become the approximate size and shape of the segments of the thorax and abdomen.

When segmentation reaches the fifth abdominal segment (Fig. 4) the tissue of the labial segment on each side of the neural groove begins to aggregate into two, round, ball-like appendage lobes. These lobes then begin to move toward the median axis of the embryo as segmentation terminates with the tenth abdominal segment (Fig. 5). In the latter stage the maxillae take on a bilobed appearance, and the mandibles assume a more diagonal position to the stomodaeum. In a slightly later stage (Fig. 6), the appendage lobes of the labium fuse at the posterior edge of the labial segment, where they then begin to migrate anteriorly and dorsally to fuse with the hypopharynx and to form the labio-hypopharyngeal body found in the larva (Fig. 10, lhb). Figures 7 & 9 show diagrammatically the anterior and dorsal migration of the labial parts. The submentum (sbm) and mentum (m) are apparent as median ventral plates while the prementum (prm) is evident as a plate which is perpendicular to the mentum and which extends dorsally to fuse with the hypopharynx. The epigular suture (epg) is also evident.

Weismann (1864) in his work on the embryonic development of *Chironomus* shows the anterior part of the labium (prementum) to be formed by the fusion of a pair of appendage-like lobes while the posterior part of the labium (mentum & submentum) is not formed from appendicular parts but consists entirely of the basal region of the body of the labium. Furthermore, Weismann shows muscle origins on the submentum, and these origins have been interpreted below as being the origins of the flexors of the labio-hypopharyngeal body in *A. quadrimaculatus*.

THE LARVAL MAXILLA

The maxilla in the larvae of Culicidae has been described by Cook (1944) as being specialized by reduction from the basic type and consisting of the stipes, which forms the main body, the palpifer, and the greatly reduced palpus. However, Farnsworth (1947) states that the maxilla in *A. quadrimaculatus* is trapezoidal in shape and is composed of the palpus, stipes and probably includes the fusion elements of the galea and lacinia.

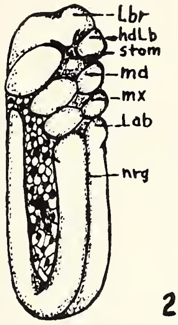
In generalized insects the maxilla bears a single condyle on its dorsal extremity by which it articulates with the lower lateral margin of the tergal region of the cranium (Snodgrass, 1935). This articulation, in insects with a prognathous type of head, as in the larva of *A. quadrimaculatus,* would put the cardo in close association with the anterior part of the submentum. Snodgrass says further that in the larva of *Tabanus* the maxilla has a generalized structure and a cardo, stipes, lacina, and galea are present. Crampton (1930) shows that in the larva of the neuropteran *Rapidia* and in a caddice fly larva the cardo is very much reduced and touches upon the submentum. Weber (1933) states that in the worker honey bee the maxillary-labial complex is also characterized by an articulate connection of the submentum with the cardo-stipes, and Anthon (1943) in his work on the head structures of larval nematocerus Diptera likewise describes a cardo element of the maxilla to be present.

The maxilla of *A. quadrimaculatus* (Fig. 8, mx) lies in a diagonal plane and is attached along its outer length to the ventral portion of the head capsule. At the base of the maxilla (Fig. 10) a small, sclerotized, rod-like structure, which appears to be the condyle of the cardo (rcd), extends dorsally to meet with a similar sclerotized rod from the floor of the submentum (rsbm). The rod from the submentum appears to be an apodeme or apophysis of the submentum. This articulation of the rod of the cardo with the rod of the submentum explains the articulate connection of the cardo with the submentum in the larva of *A. quadrimaculatus.* At the above point of articulation the flexor of the cardo inserts (Fig. 10, fcd), and this muscle has its origin near the posterior tentorial pits (See Fig. 8, fcd).

Explanation of Plate I

Figs. 1–7. Embryos showing beginning and termination of segmentation and differentiation of gnathal segments. Fig. 8. Ventral view of larval head capsule. Fig. 9. Diagrammatic ventral view of larval head capsule showing anterior and dorsal migration of the labial parts. Abbreviations for Figures 1–9: ant—antennae, epg—epigular suture, fcd—flexor of cardo, flhb—flexor of labiohypopharyngeal body, gal—galea, hdlb—head lobe, hs—hypostomal suture, lab—labium, lac—lacinia, lbr—labrum, m—mentum, md—mandible, mx—maxilla, mxp—maxillary palpus, nrg—neural groove, otm—outer tooth of mentum, pgn—postgena, prm—prementum, ptp—posterior tentorial pits, stip—stipes, I–III—thoracic segments, 1–6—abdominal segments.

MENEES PLATE I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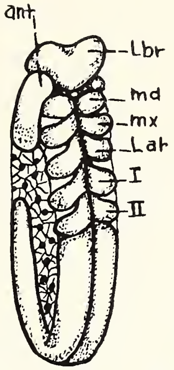
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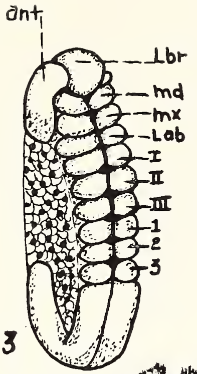
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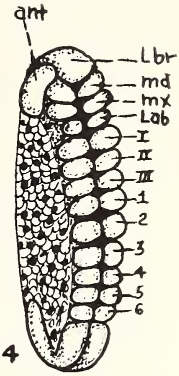
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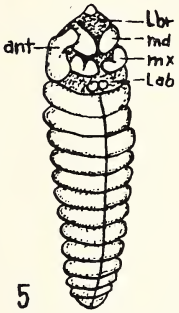
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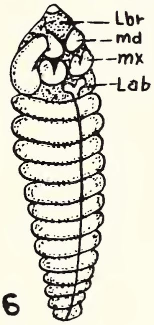
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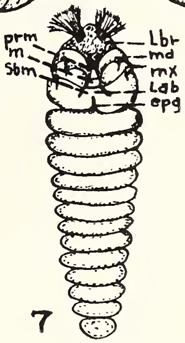
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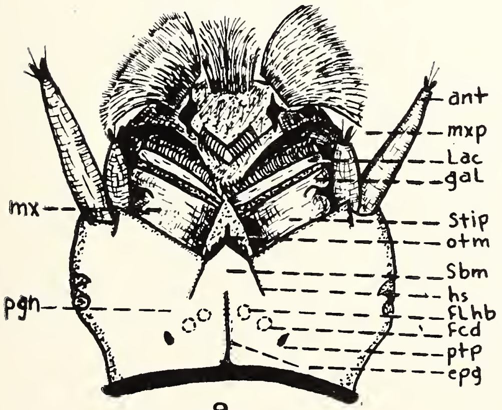
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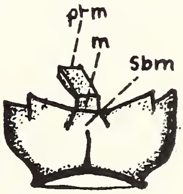

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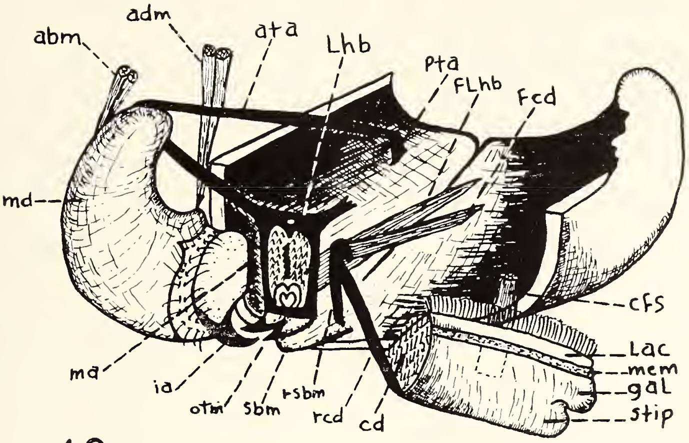
The flexor of the cardo appears to be homologous with the promotor of the cardo, although Farnsworth and Cook called it the maxillary muscle. Snodgrass (1928) says that in the maxilla of the grasshopper *Dissosteira carolina* the promotor of the cardo is a small fan of fibers arising on the lower posterior part of the postgena, external and anterior to the mandibular abductors and is inserted on a slender apodeme of the basal arm of the cardo. The rod of the cardo, which can be thought to be both the condyle of the cardo and the basal arm of the cardo in the maxilla of *A. quadrimaculatus* does give off an apodeme at its articulation point with the rod from the submentum, and the flexor of the cardo inserts on this apodeme. When one considers that the sclerites of the larval head capsule of this mosquito have been greatly modified in comparison with those of generalized insects, then it is evident that the flexor of the cardo most probably had its origin at one time on the postgenal area of the head capsule. This is evident from Figure 8 which shows the flexors of the cardo to have their origins slightly anterior to the posterior tentorial pits, slightly external to the flexors of the labio-hypopharyngeal body and almost on line with the hypostomal sutures. A slight shift of the origin of this pair of muscles was probably necessary in order to increase the strength of the muscle. According to Cook, the apodeme acts as a lever to increase the strength of these muscles. This is probably true to some extent, but the rod from the cardo extends

Explanation of Plate II

Fig. 10. Diagrammatic interior view of larval head capsule showing the association of the maxillary structures with the labial structures. Fig. 11. Frontal view of the labio-hypopharyngeal body, mentum, and submentum. Fig. 12. Lateral view of same. Abbreviations for Figures 10–12: abm—abductor of mandible, adm—abductor of mandible, atm—anterior tentorial arm, cd—cardo, cfs—cranial flexor of stipes, fcd—flexor of cardo, flhb—flexor of labio-hypopharyngeal body, gal—galea, gl—glossa, hss—heart-shaped structure, ia—incisor area, itm—inner tooth of mentum, lac—lacinia, lhb—labio-hypopharyngeal body, lp—labial palpi, ma—molar area, md—mandible, mem—membranous area, otm—outer tooth of mentum, pgl—paraglossa, prm—prementum, pta—posterior tentorial arm, rcd—rod of cardo, rsbm—rod of submentum, rt—ridge teeth, sbm—submentum, sd & sdo—salivary duct & orifice, ss & st—sides of hypopharynx and its sclerotized teeth, stip—stipes.

MENEES PLATE II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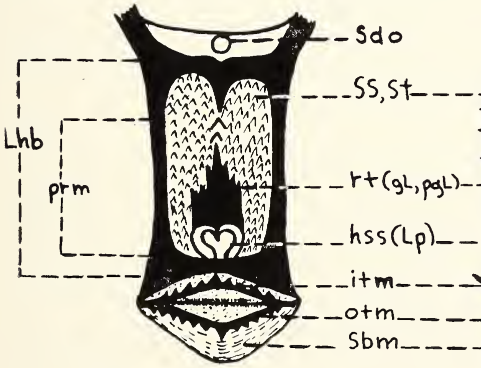
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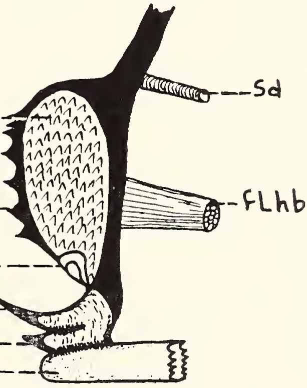

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dorsally in a diagonal fashion to meet with the rod from the submentum and if the origins of the flexors of the cardo were on the postgenal area then these muscles would not insert perpendicular to the apodeme. Therefore, in order to exert the greatest potential of contraction physical-wise the origins of the flexors of the cardo had to move inward towards the epigular suture.

Farnsworth in her work on the musculature of the larval head capsule of *A. quadrimaculatus* shows the origins of the flexors of the cardo to be slightly posterior to the origins of the mandibular abductors, although the latter are external to the origins of the flexors of the cardo. It appears, then, that although the origins of the flexors of the cardo have been shifted slightly more toward the median axis of the head capsule, the insertions of these muscles have remained constant to conclusively identify the muscle and the part of the maxilla with which it is associated.

The other muscle associated with the maxilla is the cranial flexor of the stipes (Fig. 10, cfs). This muscle has its origin on the latero-ventral portion of the ocular lobe and its insertion on the dorsal surface of the stipes.

Definite vestiges of the lacinia, galea, and cardo are fused with the stipes. The lacinia (Figs. 8 & 10, lac) is the very small sclerotized area bearing the hookbristles (Hakenborsten of Schremmer, 1949) and is separated from the vestige of the galea (gal) by a narrow membranous area (mem). The galea and stipes (stip) have fused, but the vestige of the galea occurs at the distal end of the maxilla as a sclerotized, lobe-like structure. All that remains of the cardo (cd) is a basal sclerotized surface and a sclerotized rod.

The Larval Labium.

In its generalized form the labium is divisible into a distal prelabium bearing the palpi and terminal lobes and a proximal postlabium largely or entirely adnate on the posterior or ventral wall of the head (Snodgrass, 1935). The body of the prelabium is commonly termed the prementum and the postlabium the postmentum. Furthermore, Snodgrass says that the mentum and submentum are more generally names that are given to subdivisions of the postlabium. Again, Snodgrass says (1932) that what happens to the labium in insects having a prognathous type of head is that a simple elongation of the posterior part of the head, unaccompanied by structural changes in the cranium, has no other effect on the labium than a mere lengthening of the basilabial or submental region of the appendage and that in many prognathous insects this elongation of the head has been accompanied by a forward migration of the posterior tentorial pits on the ventral head wall, with a consequent lengthening of the lower ends of the postoccipital suture behind the pits. Snodgrass goes on to say that there is thus added to the submental region of the basilabium a proximal area of varing extent known as the gula and that though the gula is but an extension of the base of the primary submentum, the two areas of the basilabium separated by an imaginary or real line between the anterior ends of the tentorial pits are now distinguished as the submentum and the gula. Crampton (1928) states that an epigular suture results from the median fusion of the gular area and therefore a definite gular area is absent. He likewise says that the submentum is usually contiguous with the gular area.

The labium in the larva of *A. quadrimaculatus* is made up of the prementum, mentum, and submentum; but these parts are greatly reduced and the prementum has fused with the hypopharynx to form a more compact sclerotized structure for feeding.

The two sides of the hypopharynx (Fig. 11, ss) lie in a vertical plane and have fused to slope backward toward the pharynx. These sides extend ventrally to the base of the prementum and have numerous, small, sclerotized teeth which fit into the molar areas of the mandibles to masticate food. The salivary duct opening (sdo) has moved dorsally to occupy a position above the median surface of the sides of the hypopharynx; the dorsal migration of the salivary duct and the fusion of the sides of the hypopharynx is apparent in *A. quadrimaculatus* when these structures are compared with their homologs in the larva of *Dixa* (see Schremmer, 1950).

The prementum (prm) has fused with the hypopharynx and lies within the hypopharynx to form a compact labio-hypopharyngeal body (lhb). The large, sclerotized, ridge teeth (rt) of the prementum extend dorsally almost to the base of the salivary duct opening and diagonally in a stepwise fashion to a heart-shape structure (hss) which lies at the base of the prementum. The ridge teeth, which appear to be the glossa (gl) and the paraglossa (pgl), and the heart-shaped structure, which appears to be the labial palpi, form the body of the prementum.

When one considers that the labial palpi are usually found at the base of the prementum in generalized insects, while the glossa and paraglossa lie at the median distal part of the prementum, then it is apparent that the heart-shaped structure in *A. quadrimaculatus*, and the finger-form organs of *A. maculipennis* as described by Schremmer (1949), are homologous with the labial palpi of generalized insects. de Meijere (1916) in his work on larvae and pupae of Diptera distinctly shows in the larva of *Ptychoptera* vestiges of the labial palpi on the prementum; and the hypopharynx, which has begun to be divided into two sloping, spinated sides, lies above the prementum. The mentum as figured by de Meijere has already acquired a serrate border and the submentum is a triangular plate which has begun to move anteriorly.

The mentum (Figs. 10, 11, 12, m) lies in a perpendicular plane to the prementum and is made up of two large sclerotized teeth—the inner (itm) and outer teeth (otm)—whose bases are contiguous with the base of the prementum. The two large teeth of the mentum hold the incisor areas of the mandibles in a transverse plane when the molar areas of the mandibles contact the sides of the labio-hypopharyngeal body (see Fig. 10). Schremmer has described the mentum of *A. maculipennis* to be similarly made up of the inner and outer teeth. Farnsworth's mentum for *A. quadrimaculatus* corresponds to Schremmer's inner tooth, and her submentum corresponds to Schremmer's outer tooth.

The submentum (Fig. 8, sbm) is a sclerotized plate on the posterior ventral portion of the head capsule which extends anteriorly from the point of origin of the flexors of the labio-hypopharyngeal body to the outer tooth of the mentum. The submentum is bordered laterally by the hypostomal sutures (hs). The epigular suture (epg) extends anteriorly from the foramen magnum and divides the submentum medianly. The submentum has been called the maxillary plate by Farnsworth and the maxillary segment by Cook. However these interpretations appear to be incorrect, for evidence from the embryonic development of the labium in *A. quadrimcaulatus* shows that a submentum develops. To add additional evidence to an interpretation of a submentum being present, Snodgrass (1935) says that the flexors of the prementum in generalized insects have their origin on the submentum, and Anderson (1936) likewise shows the flexors of the prementum in coleopterus larvae to have their origin on the submentum. It appears, then, that the flexors of the labio-hypopharyngeal body in *A. quadrimaculatus* are the flexors, or the retractors, of the prementum and therefore a prementum and submentum are present. Also, if reduction of head segments begins with the labial segment and proceeds anteriorly through the maxillary, mandibular and even the antennal segment as has been stated by Ferris (1944) then it would not be logical to interpret a maxillary plate or segment to be present in the morphological area described by Farnsworth and Cook, for the maxillary segment would undergo reduction also in relation to the labial, mandibular and antennal segment.

Shalaby (1957, 1956) has completed the most recent study on the mouthparts of larval Culicidae in his works on the mouthparts of *A. quadrimaculatus* and on the labium-hypopharynx of *Culex molestus.* But some of Shalaby's interpretations appear to be in error, for he does not take into consideration the concept of muscle origin and insertion to define mouthparts and their structures. This concept is very important when one attempts to interpret such highly modified and reduced mouthpart structures as those found in larval Diptera. Shalaby interprets the submentum correctly, but his mentum corresponds to what I think is the anterior part of the submentum; his prementum corresponds to what Schremmer and I have called the inner and outer teeth of the mentum, and Shalaby states that these teeth represent the glossa and paraglossa and that they constitute the main crushing apparatus for the mouth. From what I have seen on the feeding actions of the larva of *A. quadrimaculatus* I cannot perceive how the inner and outer teeth of mentum could have enough surface area to accommodate the mandibular molar areas for crushing food particles. The inner and outer teeth of the mentum do, to some extent, take part in crushing food, but the labio-hypopharyngeal body seems better adapted for this, for the latter has more surface area, more small spines and ridge teeth, which may act as sieves to separate food particles, and probably has sensory areas responsive to olfaction and taste. As to the heart-shaped structures which I have homologized with the labial palpi, Shalaby considers them to be homologous with the paragnaths of generalized insects. Snodgrass says that the paragnatha are a pair of lobes of the gnathal region of the Crustacea situated between the mandibles and the first maxillae and that a similar pair of lobes, the superlinguae, is present in some insects as lateral parts of the hypopharynx. Snodgrass says further that the superlinguae are best developed in apterygotan insects and in only some of the lower Pterygota. If one considers, for a moment, that the Diptera are a highly evolved and complex Order of insects, then it is apparent that paragnaths are not present in larval Diptera.

In summary, the above investigation has pointed out that the larval maxilla of *A. quadrimaculatus* is made up of the palpus, and the fused vestiges of the lacinia, galea, stipes and cardo, and that the flexors of the cardo, which appear to be homologous with the promotor of the cardo of generalized insects, and the cranial flexor of the stipes are the muscles associated with the maxilla. The larval labium is made up of the submentum, the inner and outer teeth of the mentum, and the prementum. The prementum retains modified vestiges of the labial palpi, glossa and paraglossa and these structures have fused with the hypopharynx to form a compact labio-hypopharyngeal body. The muscles associated with the labium are the flexors of the labio-hypopharyngeal body and these muscles appear to be homologous with the flexors, or retractors, of the prementum of generalized insects.

Literature Cited

Anderson, W. H. 1936. A comparative study of the labium of coleopterous larvae. Smithson. Misc. Coll. 95(13): 1–29, 8 pls.

Anthon, H. 1943. Der Kopfbau der Larven einiger Nematoceren Dipterenfamilien. Spolia Zoologica Musei Hauniensis 3: 1–61, 11 pls.

Becker, E. 1938. The mouth apparatus of the *Anopheles* larvae and its movements in feeding upon organisms on the surface of the water. (In Russian with English summary). Zool. J. Moscow 17: 427–440, 12 figs.

Butt, F. H. 1957. The role of the premandibular or intercalary segment in segmentation of insects and other arthropods. Trans. Amer. Ent. Soc. 83: 1–30, 78 figs.

Cook, E. F. 1944. The morphology of the larval heads of certain Culicidae. Microent. 9: 38–68, 17 figs.

Crampton, G. C. 1928. The eulabium, mentum, submentum and gular region of insects. J. Ent. Zool. 21: 1–18, 38 figs.

Crampton, G. C. 1930. A comparison of the more important structural details of the larva of the archaic taynderid Dipteron *Protoplasa fitchii* with other Holometabola from the standpoint of phylogeny. Bul. Brooklyn Ent. Soc. 25: 239–258, 33 figs.

DeCoursey, J. D. & Webster, A. P. 1952. A method of clearing the chorion of *Aedes sollicitans* (Walker) eggs and preliminary observations on their development. Ann. Ent. Soc. Amer. 45: 625–632, 18 figs.

de Meijere, J. C. H. 1916. Beitrage zur Kenntnis der Dipteren-Larven und Puppen. Zool. Jahrb. Systematik. 40: 177–322, pls. 4–14.

Farnsworth, M. W. 1947. The morphology and musculature of the larval head of *Anopheles quadrimaculatus* (Say). Ann. Ent. Soc. Amer. 40: 137–151, 3 pls.

Ferris, G. F. 1944. On certain evolutional tendencies in the heads of insects. Microent. 9: 78–84.

Franco, J. & Arnold, J. 1953. Embryology of *Aedes nigromaculis* (Ludlow). Proc. 22nd Conf. Calif. Mosq. Control Ass., Turlock, pp. 53–57, 21 figs.

Holmgren, N. 1904a. Zur Morphologie des Insektenkopfes. I. Zum metameren Aufbau des Kopfes der *Chironomus* larve. Zeit. fur Wiss. Zool. 76: 439–477, pls. 27–28.

Holmgren, N. 1904b. Zur Morphologie des Insektenkopfes. II. Einiges uber die Reduktion des Kopfes der Dipterenlarven. Zool. Anz. 27: 343–355.

Imms, A. D. 1907. On the larval and pupal stages of *Anopheles maculipennis* (Meigen). J. Hygiene 7(2): 291–318.

Imms, A. D. 1908. On the larval and pupal stages of *Anopheles maculipennis* (Meigen). Parasitology 1(9): 103–133.

Johannsen, O. A. 1903. Aquatic nematocerous Diptera. I. N. Y. State Mus. Bul. 68: 328–441.

Johannsen, O. A. 1905. Aquatic nematocerous Diptera. II. N. Y. State Mus. Bul. 86: 76–315.

Johannsen, O. A. 1934. Aquatic nematocerous Diptera. Part I. Nemocera, exclusive of Chironomidae and Ceratopogonidae. Memoir 164, Cornell Univ. Agric. Exp. Sta., Ithaca, N. Y.

Kellog, V. L. 1902. The development and homologies of the mouthparts of insects. Amer. Nat. 36: 683–706, 26 figs.

Meinert, F. 1886. De eucephale myggerlarven. Det Kongelige Danske Videnskabernes. Selskabs Skrifter. Sjette Raekke. Naturvidenskabelig og Mathematisk Afdeling. Tredje Bing., pp. 372–493.

Raschke, E. W. 1887. Die larve von *Culex nemorosus.* Ein betrag zur kentniss der insecten anatomie und histologie. Archiv. fur Naturgeschichichte 53: 133–163.

Schremmer, F. 1949. Morphologische und funktionelle Analyse der Mundteile und des Pharynx der larvae von *Anopheles maculipennis* (Meigen). Oesterr. Zool. Zeit., Vienna 2: 172–222, 14 figs.

Schremmer, F. 1950. Bau und Funktion der Larvenmundteile der Dipterengattung *Dixa* (Meigen). Osterr. Zool. Zeit., Vienna 2: 379–413.

Shalaby, A. M. 1956. On the mouthparts of the larval instars of *Anopheles quadrimaculatus* (Say). Bul. Soc. Ent. D'Egypte 40: 137–174, 37 figs.

Shalaby, A. M. 1957. The homology of the labium-hypopharynx complex of the larva of *Culex molestus* (Forsk.). (Diptera: Culicidae). Ann. Ent. Soc. Amer. 50: 265–270, 5 figs.

Snodgrass, R. E. 1928. Morphology and evolution of the insect head and its appendages. Smithson. Misc. Coll. 81(3): 158 pp.

Snodgrass, R. E. 1932. Evolution of the insect head and the organs of feeding. Smithson. Rept. 1931: 443–489.

Snodgrass, R. E. 1935. Principles of insect morphology. McGraw-Hill Book Co., New York, 667 pages.

Weber, H. 1933. Lehrbuch der Entomologie. Gustav Fischer, Jena 726 pp.

Weismann, A. 1864. Die Entwicklung der Dipteren. I. Die Entwicklung der Dipteren im Ei. II. Die nachembryonale Entwicklung der Musciden. Wilhelm Engelmann, Leipzig, 263 pp., 14 pls.

Dolichopodidae in Light Traps: The fly, *Hydrophorus praecox* (Lehm.) was observed to be present in very large numbers in black-light trap samples from Roy, Utah, on many occasions during the summer of 1957. On July 15, a count of 10 percent of the catch yielded 121 of these flies, or approximately 1,210 for the night's catch. The July 17 catch was estimated at 450 to 500, based on a count of about ½ of the collection. The July 18, 1957 take was estimated at 650 *H. praecox*. 16 specimens were taken, as a sample for identification, from the numerous specimens in the August 11 trap catch made at Spanish Fork. All of these proved to be *H. praecox*. Of five flies taken from the black-light trap catch at Benjamin, August 15, four were *H. praecox* and one was a *H. philombreus* Whlr. I am indebted to F. C. Harmston for these identifications.—George F. Knowlton, Logan, Utah.

THE AEDES MOSQUITOES OF NEW ENGLAND. PART I: KEY TO ADULT FEMALES[1]

Marion E. Smith, Amherst, Mass.

Since publication of Johnson's (1925) list of twenty-two species of *Aedes* known to occur in New England, only two additional species have been reported: *grossbecki* D. & K. (Fellton, Barnes and Wilson, 1950), and *decticus* H., D. & K. (the *pseudodiantaeus* of Smith, 1952). Through the courtesy of Dr. Alan Stone, a twenty-fifth species can now be added to the list: *Aedes mitchellae* (Dyar). A female specimen, collected by the C. C. C. Survey in Chicopee Falls, Mass., on June 15, 1934, and determined by Dr. Stone, is in the collection of the U. S. National Museum, and another specimen, a female taken by Robert L. Armstrong on Cape Cod, Mass., about 1940, and now in the University of Massachusetts collection, is also almost certainly of this species. Of the twenty-five *Aedes* species, the majority are typical northern forest-zone insects, widely distributed through northern United States and Canada, with nine of them also found in the Old World; a few are occasional intruders from a more southern range. Several additional species which are collected occasionally in adjacent areas will undoubtedly be added to the New England list in future years.

The identification of adult female *Aedes* mosquitoes, particularly the black-legged species, is usually difficult and often impossible, since keys are based chiefly upon the color and distribution of easily-rubbed-off scales. Moreover, many species vary widely in their color patterns, and others resemble each other closely with few or no absolute differentiating characters. However, tremendous advances in the recognition of these insects have been made within the past quarter century, and particularly within the decade. Such workers as Gjullin, Knight, Natvig, Peus, and Vockeroth have demonstrated the value of characters which make possible less emphasis on the variable and easily-lost color patterns of the scutum.

The present key attempts to provide for the observed range of variation in so far as local populations have been studied, and to aid in the identification of similar species and of partially denuded specimens. Characters introduced individually by other workers are combined within a single key; multiple characters are used when possible; and supplementary characters for each species have been included within parentheses. Structures and areas mentioned in the key may be located on the accompanying figures. Although intended primarily for the identification of female specimens, most males will key out satisfactorily if consideration is given to the differences in structure of the antennae, palpi, and claws, and to the reduced scalation of the abdomen; the distribution of setae and scales, and the color patterns of the male otherwise are essentially those of the female. The key has been used, in its progressive stages, by several successive groups of graduate students, with a high percentage of accurate determinations. For their criticism the author is indebted. Sincere appreciation is also expressed to those who have kindly loaned specimens or have helped in other ways, particularly Dr. H. D. Pratt of the U. S. Public Health Service, Dr. Alan Stone of the U. S. National Museum, and Dr. J. R. Vockeroth of the Canadian Science Service.

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KEY TO SPECIES

1. Some tarsal segments with basal and sometimes apical rings of pale scales 2
Tarsal segments without white rings 13

2. Proboscis with a distinct ring of pale scales near middle (very rarely reduced); metameron bare, without pale scales .. 3
Proboscis without a distinct pale ring, but sometimes with numerous scattered pale scales; metameron with or without pale scales 5

3. Wing veins with many scattered pale scales; first segment of hind tarsi with a pale median ring; (scutal scales mostly golden to brown, darker laterally; most tarsal segments with pale basal rings; abdomen usually with a pale mid-dorsal longitudinal stripe, the sternites entirely pale-scaled; larvae in salt or brackish water) ...... *sollicitans* (Wlk.)
Pale scales of wing restricted to base of costa or absent; hind basitarsi with pale scales not forming a complete median ring 4

4. Abdomen with mid-dorsal patches of pale scales, often forming a continuous stripe; femora speckled anteriorly with numerous pale scales; (palpi usually with white scales dorsally as well as apically; scutal scales pale to golden brown, much darker laterally; tarsi with wide basal rings on some seg-

ments, occasionally with apices narrowly white; sternites mostly pale-scaled; a southern species, rarely found in New England) .... *mitchellae* (Dyar)

Abdomen without mid-dorsal patches of white scales; femora mostly dark-scaled anteriorly; (palpi usually dark-scaled except for white apices; scutum with brownish scales, anterior margin pale-scaled; most tarsal segments with wide basal rings and usually very narrow apical rings; a salt marsh or brackish water species) ... *taeniorhynchus* (Wd.)

5. Tarsi with pale rings at both ends of some segments 6

Tarsi with pale rings at bases of segments only 8

6. Wing veins with pale scales more numerous than dark ones; (scutum pale-scaled with median and usually lateral brown stripes; pleural scale patches extensive and confluent; postcoxal area, hypostigial area, and metameron with pale scales; abdomen usually entirely pale-scaled or with a pair of dark dorsal spots on each segment) .... *dorsalis* (Mg.)

Wing scales all dark, or with pale scales confined to base of costa; (pleural scale patches reduced and separated; postcoxal area, hypostigial area, and metameron without scales) 7

7. Costa black-scaled at base; scutum with reddish-brown to dark brown scales, often with indications of submedian lines of pale scales; (torus without and apex of palpus with a few pale scales; sternites usually entirely pale-scaled) .... *canadensis* (Th.)

Costa broadly pale-scaled at base; scutum with a broad median longitudinal stripe or pair of stripes of dark scales; (torus with and palpus without pale scales) .. *atropalpus* (Coq.)

8. Metameron (and often torus and postcoxal area) with pale scales; pale rings of at least some segments of hind tarsi usually two to three times as long as wide or longer 9

Metameron, postcoxal area, and torus without pale scales; pale rings of hind tarsi usually very short, seldom more than twice as long as wide; (scutum with golden-brown scales, occasionally with a few pale ones; anterior veins of wings often with scattered pale scales; lower mesepimeral setae absent; sternites with inverted V-shaped black markings) .... *vexans* (Mg.)

9. Wing veins with few to many pale scales; postcoxal area with pale scales; (scutum with a more or less distinct broad

median stripe and posterior half-stripes of brown scales, bordered by pale ones) 10

Wing scales all dark; postcoxal area without scales; (scutum uniformly covered with reddish to dark brown scales; lower mesepimeral setae usually present; sternites and usually apical tergites with pale yellowish scales; a salt marsh species) .... *cantator* (Coq.)

10. Most dorsal wing scales conspicuously broad, triangular, about twice as long as wide; pale scales numerous, even in posterior wing fringe; (lower mesepimeral setae usually 2 or 3, sometimes 0; torus pale-scaled; a southern species, rare in New England) .... *grossbecki* D. & K.

Wing scales more elongate, three or more times as long as wide; pale scales usually absent or reduced in number on posterior margin of wing 11

11. Tarsal claws of female (and hind claws of male) comparatively straight or slightly sinuous beyond the nearly parallel tooth, the tooth usually longer than distance between its apex and apex of claw (Fig. 2A); lower mesepimeral setae usually absent) .... *excrucians* (Wlk.)

Tarsal claw strongly arched, with a shorter and more divergent tooth about equal in length to the distance between its apex and that of the claw (Fig. 2B); lower mesepimeral setae present or absent 12

12. Lower mesepimeral setae 0 to 2, rarely 3 or 4; pale scales of wings usually numerous; torus usually pale-scaled; (not always separable from *A. stimulans*) .... *fitchii* (F. & Y.)

Lower mesepimeral setae usually 3 or more, well-developed; pale scales on wings often few in number, located chiefly on anterior veins; torus often without pale scales; (not always separable from *A. fitchii*) ..... *stimulans* (Wlk.)

13. Postcoxal area with pale scales on inner surface; metameron with pale scales; lower mesepimeral setae usually present 14

Postcoxal area without scales on inner surface, although there may be overhanging scales along upper margin; metameron with or without pale scales; lower mesepimeral setae absent in most species 17

14. Pleural scale patches extensive and confluent (but easily rubbed off), reaching anteriorly along upper margin of sternopleuron to propleural scale patch, and on mesepimeron to lower anterior angle 15

Pleural scale patches reduced, widely separated from propleural patch and from lower margin of mesepimeron; (both torus and base of costa with distinct patches of white scales; occiput with one or two dark scale patches on each side; scutum with more or less distinct median stripe or stripes and posterior half-stripes of reddish brown scales, the postpronotum often with patches of the same color; supra-alar bristles darker than pre-alars; hypostigial area sometimes with a few pale scales; a northern species, rarely found in New England) .... *implicatus* Vock.

15. Wing veins with few if any basal white scales; hypostigial area without scales; supra-alar bristles yellow or coppery, often no darker than pre-alars 16

Torus and base of costa, and usually of other veins, with numerous pale scales; hypostigial area with many pale scales; supra-alar bristles darker than pre-alars; (scutum grayish white or with a broad median stripe, often poorly defined, of bronzy scales usually intermingled with pale ones, the anterior and lateral margins of scutum grayish) .... *trichurus* (Dyar)

16. Scutum variably marked, usually with distinct median stripe or stripes (sometimes indistinct or absent) of coppery to dark brown scales, the sides pale yellowish to reddish; posterior half-stripes and postpronotal patches of darker scales sometimes present; base of costa frequently, and torus occasionally, with a few pale scales, (not always separable from *A. abserratus*) .... *punctor* (Kby.)

Scutum and postpronotum usually uniformly covered with minute coppery scales, the scales sometimes arranged so as to give the appearance of stripes; less frequently with definite scutal stripes of scales darker than the yellowish sides, and the post-pronotum usually with a patch of coppery scales; costa dark-scaled at base, torus occasionally pale-scaled; (not always separable from *A. punctor*) .... *abserratus* (F. & Y.)

17. Pale basal bands of abdominal tergites much narrowed or absent mid-dorsally (rarely well-developed) and scutum with distinct longitudinal stripe or stripes of darker scales; (sternopleural scale patch widely separated from propleural scales; metameron often without scales) 18

Pale basal bands of abdomen distinct and rarely much narrowed mid-dorsally; scutum with or without dark dorsal stripe or stripes, but if present then the sternopleural scale patch reaches anteriorly along upper margin nearly to propleural scale patch, and metameron has pale scales 22

18. Median area of scutum covered with a broad longitudinal stripe of very dark scales, much widened posteriorly and only rarely divided by a mid-dorsal line of pale scales; sides of scutum silvery white or deep golden yellow 19

Scutum with a narrower median stripe or pair of stripes of dark brown scales; sides of scutum pale yellowish or with dark stripes; torus and base of costa dark-scaled 20

19. Sides of scutum golden yellow; (occiput, fore coxae, and postpronotum usually with patches of dark scales; torus and base of costa with dark scales only; abdominal sternites pale-scaled) .... *aurifer* (Coq.)

Sides of scutum silvery white; (occiput, fore coxae, and postpronotum entirely white-scaled; anterior margin of scutum and usually bases of costa and subcosta with pale scales; sternites banded apically with dark scales) .... *triseriatus* (Say)

20. Scutum with a pair of narrow submedian longitudinal stripes of dark scales, and often with posterior half-stripes, all usually separated by narrow lines of yellowish scales and only rarely fused into a solid dark area; sides of scutum pale yellowish; (abdominal sternites banded apically with dark scales; tibiae and tarsi with pale scales few or absent) 21

Scutum with a pair of longitudinal submedian stripes of whitish to yellowish scales separating three subequal dark brown stripes which taper posteriorly, the outer brown stripes covering sides of scutum to wing bases; (occiput usually with patches of dark scales; abdominal sternites pale-scaled; tibiae and tarsi with numerous pale scales) .... *trivittatus* (Coq.)

21. Occiput with pale yellowish scales only; postpronotum rarely with dark scales; (lower mesepimeral setae occasionally present; metameron usually with a few pale scales; sternopleuron with 12 to 20 setae; torus integument dark) .... *diantaeus* (H., D. & K.)

Occiput and postpronotum with few to many dark appressed scales; (lower mesepimeral setae absent; metameron without scales; sternopleuron with not more than 10 setae, usually 5 or 6; torus yellowish to dark brown; a small species) .... *decticus* (H., D. & K.)

22. Pleural scale patches extensive and confluent, reaching anteriorly along upper margin of sternopleuron to propleural scale patch, and on mesepimeron to lower anterior angle; lower mesepimeral setae stout; (metameron, torus, and usually base of costa pale-scaled; scutum with yellowish, reddish, or rarely grayish scales with or without median stripes, posterior half-stripes, and postpronotal patches of reddish brown to dark scales; supra-alar bristles darker than pre-alars) .... *communis* (DeG.)

    One or both pleural scale patches reduced, not reaching lower margin of mesepimeron or (except in some *sticticus*) propleural scale patch; lower mesepimeral setae usually absent except in some *intrudens* 23

23. Fore coxae with patches of flat dark scales; metameron without scales; torus and base of costa with dark scales only; (scutum uniformly covered with minute coppery to brown scales; fore femora striped; lower mesepimeral setae absent; a small species) .... *cinereus* (Mg.)

    Fore coxae with pale scales only; metameron with at least a few pale scales; torus and base of costa frequently pale-scaled 24

24. Scutum with median longitudinal stripe or stripes (sometimes indefinite) of fine golden to dark brown scales, with posterior half-stripes and large post-pronotal patches of the same color; (torus, costa, and subcosta usually with a few pale scales; femora speckled; lower mesepimeral setae usually absent) .... *sticticus* (Mg.)

    Scutum and postpronotum uniformly covered with rough brownish yellow scales, rarely with median stripes of darker scales; (torus, base of costa, and hypostigial area occasionally with a few pale scales; lower mesepimeral setae usually present) .... *intrudens* Dyar

SELECTED REFERENCES

Carpenter, S. J. and W. J. LaCasse. 1955. Mosquitoes of North America. University of California Press, 360 pp.

Fellton, H. L., R. C. Barnes and C. A. Wilson. 1950. New distribution records for the mosquitoes of New England. Mosquito News 10: 84–91.

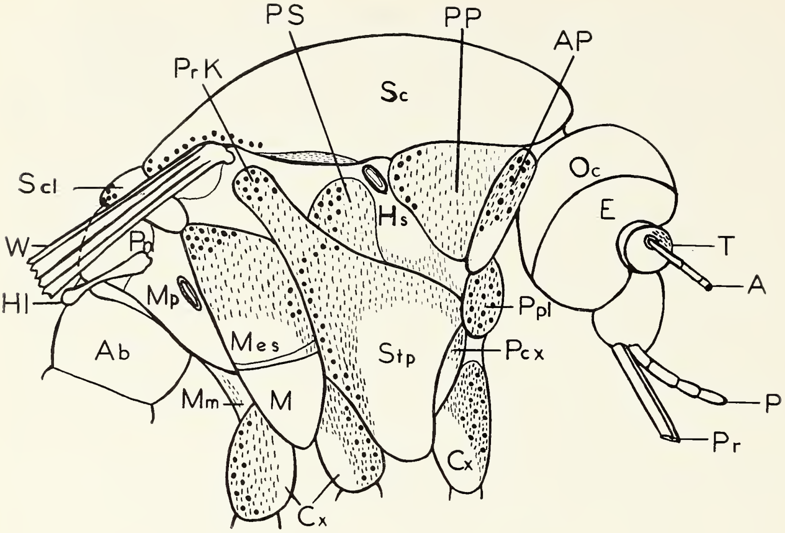

FIG. 1

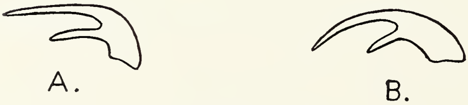

FIG. 2

Fig. 1. Lateral view of head and thorax of *A. abserratus* (F. & Y.); on pleural sclerites, location of setae indicated by dots, of scale patches by shading. A—antenna, Ab—abdomen, AP—anterior pronotum, Cx—coxa, E—eye, Hl—halter, Hs—hypostigial area, M—meron, Mes—mesepimeron, Mm—metameron (meteusternum), Mp—metapleuron, Oc—occiput, P—palpus, Pcx—postcoxal area, Pn—postnotum, PP—posterior pronotum (postpronotum), Ppl—propleuron (proepisternum), Prk—prealar knob, PS—postspiracular area, Sc—scutum (mesonotum), Scl—scutellum, Stp—sternopleuron, T—torus, W—wing. Fig. 2. Fore claw of female: A. *A. excrucians* (Wlk.); B. *A. stimulans* (Wlk.) or *A. fitchii* (F. & Y.)

Gjullin, C. M. 1946. A key to the *Aedes* females of America north of Mexico. Proc. Ent. Soc. Wash. 48: 215–236.

Johnson, C. W. 1925. List of the Diptera or two-winged flies. Part 15, *in* Fauna of New England. Boston Soc. Nat. Hist. Occas. Pap. VII: 1–326.

Knight, K. L. 1951. The *Aedes* (*Ochlerotatus*) *punctor* subgroup in North America. Ann. Ent. Soc. Amer. 44: 87–99.

Matheson, R. 1945. Family Culicidae, the mosquitoes. Guide to the insects of Connecticut, Part VI, Fasc. 2, Conn. Geol. and Nat. Hist. Surv. Bul. 68: 1–48.

Natvig, L. R. 1948. Contributions to the knowledge of the Danish and Fennoscandian mosquitoes. Norsk Ent. Tids. Suppl. I, 567 pp.

Peus, F. 1933. Zur Kenntnis der *Aedes*-Arten des deutschen Faunengebietes (Dipt., Culicidae). Die Weibchen der *Aedes-communis*-Gruppe. Konowia 12 (1–2): 145–159.

Tulloch, G. S. 1939. A key to the mosquitoes of Massachusetts. Psyche 46: 113–136.

Vockeroth, J. R. 1950. Specific characters in tarsal claws of some species of *Aedes*. Can. Ent. 82: 160–162.

———— 1954. Notes on the identities and distributions of *Aedes* species of northern Canada, with a key to the females. Can. Ent. 86: 241–255.

Leafhoppers in Alfalfa: A collection of Cicadellidae was made from an alfalfa field at Jensen, Utah, July 11, 1956. "Witch's broom" disease was abundant here, hence the interest in the possible leafhopper disease vectors. Dr. D. A. Young found the following species to be present: 125 *Acceratagallia aridae* Oman and *A. fuscoscripta* Oman combined, 12 *Scaphytopius acutus* (Say), 4 *Macrosteles fascifrons* (Stal), 1 *Opsius stactogalus* Fieb., 1 *Endria inimica* (Say), 2 *Psammotettix* sp., 2 *Scaphytopius* sp., 2 *Texanus* sp.—George F. Knowlton, Logan, Utah.

UNDESCRIBED SPECIES OF NEMATOCEROUS DIPTERA. PART V.*

By Charles P. Alexander, Amherst, Mass.

The preceding part under this general title appeared in 1956 (Bul. Brooklyn Ent. Soc. 51: 75–81). At this time I am describing two new species of Ptychopteridae and two of Blepharoceridae, the types being preserved in my collection with the exception of one species in the Natural History Museum, Vienna.

PTYCHOPTERIDAE

Ptychoptera matongoensis, n. sp.

Mesothorax yellow, the praescutum and scutal lobes patterned with opaque black in the form of confluent stripes; rostrum yellow; antennae with scape and pedicel yellow, flagellum brownish black; posterior part of head brilliant metallic blue; femora yellow, the tips narrowly dark brown; wings obscure yellow, the prearcular and costal regions more strongly so, wing tip and a narrow band over cord brown; abdominal tergites orange, the third and succeeding tergites with the posterior borders deep black, more extensive on the subterminal segments; ovipositor and genital segment orange.

Female: Length about 10–11 mm.; wing 10–11 mm.

Rostrum yellow; palpi obscure yellow, the outer segment more infuscated. Antennae with the scape and pedicel yellow, flagellum brownish black, the first segment somewhat paler; flagellar segments cylindrical, longer than the verticils. Front and antennal fossae orange-yellow, the posterior part of head brilliant shiny metallic blue.

Pronotum yellow. Mesonotal praescutum with anterior end and lateral borders orange, the remainder of disk with a central opaque blackened area, representing the usual stripes, crossing the suture and including the scutal lobes where there are two unequal areas on each lobe; scutellum orange; postnotum and pleura light yellow. Halteres infuscated. Legs with all coxae and trochanters yellow; femora yellow, the tips narrowly dark brown, the amount subequal on all legs (1 mm. or less); tibiae and tarsi dark brown. Wings obscure yellow, the prearcular and costal fields more strongly so; a conspicuous pale brown pattern including a narrow band at cord, narrowed behind and becoming obsolete at the bend of Cubitus; wing tip broadly pale brown, extending basad to beyond the forks, which, with the veins beyond them, are restrictedly seamed with still darker brown; posterior border as far basad as vein *2nd A* vaguely darkened; veins brown, more yellowed in the brightened fields. Venation: *Rs* short, oblique, meeting R_{2+3} at a sharp angle, basal section of R_{4+5} short to very short; radial fork much deeper than the medial one.

---

* Contribution No. 1290 from the Entomological Laboratory of the University of Massachusetts.

Abdominal tergites orange, the first and second segments restrictedly darkened medially, the third and succeeding tergites with posterior borders narrowly deep black, the amount increasing on the fifth and succeeding segments to form a ring; ovipositor and preceding segments orange.

Habitat: Tanganyika.

Holotype: ♀, Ugano, Matongo Highlands, 1500–1700 meters, September 28, 1938 (F. Zimmer). *Paratype,* ♀, Songea, 1100 meters, April 28–May 2, 1936 (H. Zerny).

Most similar to *Ptychoptera africana* Alexander, of southern Nigeria, differing conspicuously in the coloration of the mesonotum. I am indebted to Dr. Max Beier, Curator of the Entomological Collections of the Vienna Natural History Museum for the loan of the important Zerny materials from the Matongo Highlands.

Bittacomorphella pacifica, n. sp.

Characters generally as in *Bittacomorphella sackenii,* differing especially in the structure of the male hypopygium.

Male: Length about 9–11.5 mm.; wing 7–9 mm.; antenna about 8.5–9 mm.

Female: Length about 9–9.5 mm.; wing 7.5–9 mm.

Antennae of male very long, approximately equal to the wing; scape pale brown, the larger pedicel yellow, flagellum black; flagellar segments very long-cylindrical. Mesonotal praescutum with four distinct black stripes; posterior sclerites of notum blackened, sparsely pruinose. Pleura heavily light gray pruinose, more darkened ventrally. Legs with the femora brownish yellow basally, passing into darker brown; tibiae brown, the tips darkened; basitarsi black, in cases with the extreme tips whitened; tarsal segments two and three snowy white; in *sackenii* the tips of basitarsi broadly white. Male hypopygium with the tergite large, posterior border shallowly emarginate, the lateral lobes small, obtuse, with long setae. Tergal arms slightly more slender than in *sackenii.* Dististyle relatively slender, as compared with *sackenii.* Phallosome distinctive, the longer or terminal point a blackened blade, narrowed to the shallowly bidentate apex, the lower tooth microscopically denticulate, especially on the ventral edge. In *sackenii* the phallosome terminates in a slender spine, its tip acutely pointed.

Habitat: Washington, Oregon, northern California.

Holotype: ♂, Mount Rainier, Washington, 4,700 feet, July 21, 1940 (Henry Townes). *Paratopotypes,* ♂♀, 2,700 feet, July 8, 1940; 4,700 feet, July 21, 1940 (Henry Townes). *Paratypes,* ♂, Peavine Ridge, McMinnville, Oregon, June 5, 1945 (Kenneth Fender); ♂, Dayton, Oregon, September 19, 1946 (Kenneth Fender); 10 ♂♀, Castle Crags State Park, Shasta Co., California, 2,000 feet, July 6–8, 1953 (Alexander); 1 ♂, Castle Crags, in *Darlingtonia* bog, 3,000 feet, July 8, 1953 (Alexander).

The discovery of male specimens of *Bittacomorphella sackenii* (von Röder) shows that material from the more northern Pacific states hitherto determined as being this species actually are distinct and are described above. The third western Nearctic species of the genus, *B. fenderiana* Alexander, is even more distinct in the structure of the male hypopygium. The hypopygium of the present fly was figured earlier (Amer. Midl. Nat. 42: 273, fig. 2, as *sackenii;* 1949), in comparison with the same structure for *B. fenderiana.* As far as known at present, *B. sackenii* is more southern in its range, being restricted to the Sierra Nevada in California and Nevada, from the general vicinity of Lake Tahoe southward.

BLEPHAROCERIDAE

Dioptopsis arizonica, n. sp.

General coloration of thorax ochreous yellow, the praescutum anteriorly patterned with brownish black; antennae with scape and pedicel yellow, flagellum black; wings with a faint dusky tinge, the whitened netlike lines conspicuous; *Rs* relatively long, nearly twice *r-m;* basal section of R_5 very short to punctiform; male hypopygium with the tergal lobes broad, obtusely rounded at tips; outer dististyle very extensive, widened outwardly, the low basal lobe rounded, with abundant stout black setae.

Male: Length about 5 mm.; wing 6 mm.; antenna about 1.3 mm.

Rostrum and palpi yellowish brown. Antennae with scape and pedicel yellow, flagellum black. Head light gray, darker behind, including the ocellar tubercle; upper division of the eye very poorly differentiated from the major lower division, long and narrow, including about four or five rows of ommatidia, its width less than the diameter of the ocellar tubercle.

Thorax ochreous yellow, median area in front and the humeral triangles brownish black, heavily gray pruinose. Pleura yellow with gray pruinose areas. Legs with the coxae and trochanters yellow, remainder of legs brownish yellow, tarsi darker. Wings with a faint dusky tinge, the white netlike lines contrasting with the ground; veins pale brown. Venation: *Rs* relatively long, arcuated, nearly twice *r-m;* basal section of R_5 very short to punctiform; basal section of M_{1+2} unusually long, exceeding four-fifths *M;* basal section of M_{3+4} long and sinuous.

Abdominal tergites light brown, variegated with paler. Male hypopygium with the tergal lobes broad, obtusely rounded at tips. Outer dististyle very extensive, widened outwardly, the outer angle obtusely rounded, the low basal lobe rounded, with abundant stout black setae. Phallosome with the gonapophyses longer and a little stouter than the penis filaments.

Habitat: Arizona (Pinal County).

Holotype: ♂, Workman Creek, Sierra Ancha, May 3, 1947 (H. and M. Townes).

The discovery of a Blepharocerid in Arizona south of the Colorado River was of unusual interest since it became the most southerly known species in the Rocky Mountain region, *Blepharocera zionensis* Alexander, of southern Arizona, formerly holding this position. The nearest regional allies are *Dioptopsis markii* (Garrett) and *D. sequoiarum* (Alexander), which differ in size, details of venation, and where known, in the structure of the male hypopygium.

Apistomyia anamalaiensis, n. sp.

Thoracic dorsum broadly orange in front, blackened behind; abdominal tergites with the median region almost continuously orange-yellow; eyes of male very large, the upper division more extensive than the lower.

Male: Length, excluding rostrum, about 5 mm.; wing 5 mm.; rostrum about 2 mm.

Rostrum black. Antennae 10-segmented, black throughout; first flagellar segment slightly longer than the second and third combined; terminal segment oval, a little longer and stouter than the preceding two. Eyes very large, the upper division, comprised of larger ommatidia, more extensive than the lower one; eyes broadly contiguous, the very reduced posterior part of head black.

Pronotum black. Mesonotal praescutum and scutum orange, the scutal lobes and confluent areas on posterior lateral parts of the praescutum black; midline at scutum with narrow darkened extensions directed cephalad; scutellum buffy yellow, concolorous with the dorsopleural membrane; postnotum very reduced, black. Pleura chiefly light gray pruinose, leaving darker areas on the sternum and meron, possibly caused by rubbing. Halteres with base of stem light brown, the succeeding part yellowed, outer half black. Legs with the coxae pruinose; trochanters testaceous yellow; femora obscure yellow, the outer ends broadly darker; tibiae and tarsi dark brown. Wings with a weak dusky tinge, the secondary netlike venation still darker, conspicuous; veins brown, those of costal field still darker. All veins strongly developed throughout; in *trilineata*, bases of the veins pale to subatrophied. Anal angle of wing rounded and only moderately developed.

Abdominal tergites brownish black laterally, the sides of the more proximal segments gray pruinose; mid-dorsal region of tergites two to six, inclusive, conspicuously orange-yellow, almost continuous, being broken narrowly at the posterior borders of the segments; sternites with a basal gray triangular area, the sides of the posterior half broadly brownish black; hypopygium black.

Habitat: South India.

Holotype: ♂, Cinchona, Anamalai Hills, 3,500 feet, April 1957 (P. Susai Nathan).

Apistomyia anamalaiensis is quite distinct from *A. trilineata* Brunetti, of Assam and the eastern Himalayas, differing evidently in the coloration of the body and wings and in the structure of the eyes. The conspicuously brightened pattern of the thorax and abdomen of the present fly is noteworthy.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

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Vol. LIII JUNE, 1958 No. 3

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. LIII JUNE, 1958 No. 3

STUDIES ON THE USE OF A DIURNAL RESTING BOX FOR THE COLLECTION OF CULISETA MELANURA (COQUILLET)[1]

By P. P. BURBUTIS[2] and D. M. JOBBINS[3]

Previous investigations on the use of artificial resting boxes for the collection and surveillance of mosquitoes have in some instances proved them to be useful collection devices. Goodwin's work (1942) in Georgia with *Anopheles quadrimaculatus* is a particularly good example. He found that a 12-inch, cubical wooden box, open at one end, and painted red inside and out was very effective in attracting these mosquitoes.

Carpenter *et al.* (1946) report that *Culiseta melanura* has been successfully collected by light traps in the south and to a lesser extent by diurnal resting boxes. The question arose whether a box similar to Goodwin's might also prove useful in collecting *C. melanuria.*

In a study of the bionomics of the mosquitoes on a bird farm at Estelle Manor, New Jersey, where epizootics of Eastern Equine Encephalomyelitis have occurred almost annually, the authors were especially interested in obtaining engorged specimens of these mosquitoes for a serological study of their host preferences. In addition to collecting mosquitoes by means of light traps, a preliminary study on the use of artificial resting boxes was initiated. The collection data from the resting boxes for the two-season study

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[1] Paper of the Journal Series, New Jersey Agricultural Experiment Station, Rutgers University, the State University of New Jersey, Department of Entomology. A research project supported primarily by a U. S. Public Health Service, NIH, grant-in-aid.

[2] Assistant Research Specialist in Entomology.

[3] Research Specialist in Entomology.

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(1955–'56) were significantly impressive and are here presented because of the current interest and importance attributed to *C. melanura* as a vector of Eastern Equine Encephalomyelitis.

METHODS AND EQUIPMENT

Seven boxes, one cubic foot in size, with one side left open, were constructed from ¼ inch plywood. They were painted inside and out with two coats of Chinese red enamel. These boxes were placed in shaded spots in an area where *C. melanura* was known to breed. Initially some of the boxes were nailed to tree trunks about 4 feet above the ground and others were placed directly on the ground. The openings faced in different directions.

The mosquitoes were collected from the boxes by first placing a cloth or a piece of mosquito netting over the opening and then capturing the mosquitoes by placing a large test tube containing a small piece of cotton soaked in chloroform over them. In 1955 the boxes were inspected a total of 42 times at intervals of once a week from June 3 up to October 13, except during the epizootic period of Eastern Equine Encephalomyelitis when the boxes were checked at least once a day. In 1956 the boxes were inspected a total of 29 times, mostly during July and August. Several of the 1955 collections were sealed and frozen for virus isolation attempts and were not identified. Therefore, the 1955 collection data are based on a total of 30 inspections.

RESULTS

It was soon learned that the boxes on the ground level and those boxes whose opening faced approximately due west were attracting a larger number of mosquitoes than the boxes placed in any other position. Thus, five of the seven boxes were placed in this manner while the remaining two boxes were left on a 3- and 4-foot level. Each box on the ground level consistently had more mosquitoes throughout the two seasons than the two left at the higher levels.

During periods when it was possible to keep a more constant check on the resting boxes, several interesting observations were made on the time of day when the greatest number of mosquitoes entered them. When the boxes were examined early in the morning between 6 and 7 A. M., very few, if any, mosquitoes were noted to be inside. However, when they were inspected on the same days between 9 and 10 A. M., they usually always contained some specimens. On warm, sunny days very few mosquitoes were recovered from the boxes after the mid-morning inspection. When the weather was rainy or overcast with high humidity prevailing, periodic examinations during the day revealed that some mosquitoes were entering the boxes throughout most of the day.

The data on the mosquitoes collected from the boxes during this study (Table I) indicates that the resting boxes are quite specific for *Culiseta melanura* and *Anopheles* species when placed in the shade in an area where these species are present, in New Jersey. The resting boxes obviously provided a good method for collecting engorged specimens of *C. melanura* since 25 blood-engorged specimens were collected from them in 1955 and 163 in 1956.

TABLE I

Mosquitoes from diurnal resting boxes
Estelle Manor, New Jersey, 1955–1956

Species	Number of Specimens		Percent of Total	
	1955	1956	1955	1956
Culiseta melanura	176	649	43	70
Anopheles species*	194	235	47	25
Culex species**	24	14	6	2
Other†	19	28	4	3
Total	413	926	100	100

* *Anopheles* species: Includes mainly *An. crucians* complex, and *An. quadrimaculatus* and few *An. punctipennis.*

** *Culex* species: Includes *Culex salinarius, C. restuans,* and *C. pipiens.*

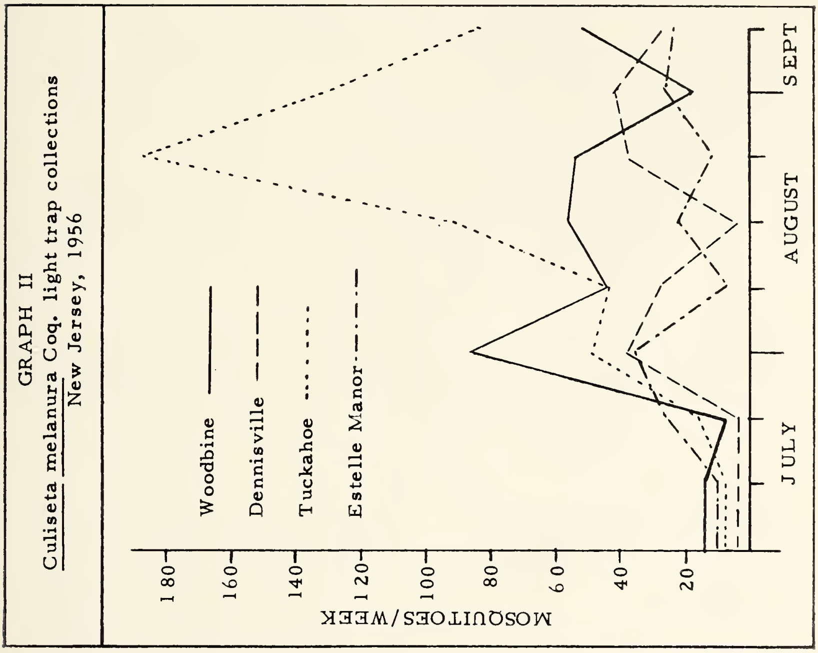
† Other: Includes *Aedes canadensis, A. sollicitans, Mansonia perturbans,* and *Uranotaena sapphirina.*

Since the season's work definitely indicated that these boxes were rather specific in attracting *C. melanura,* the question arose whether they might also yield additional information on the biology or life history of this species, such as relative abundance and seasonal distribution. Inasmuch as the New Jersey mosquito light trap is the most widely employed device for sampling adult mosquito populations, an attempt was made to compare the two techniques.

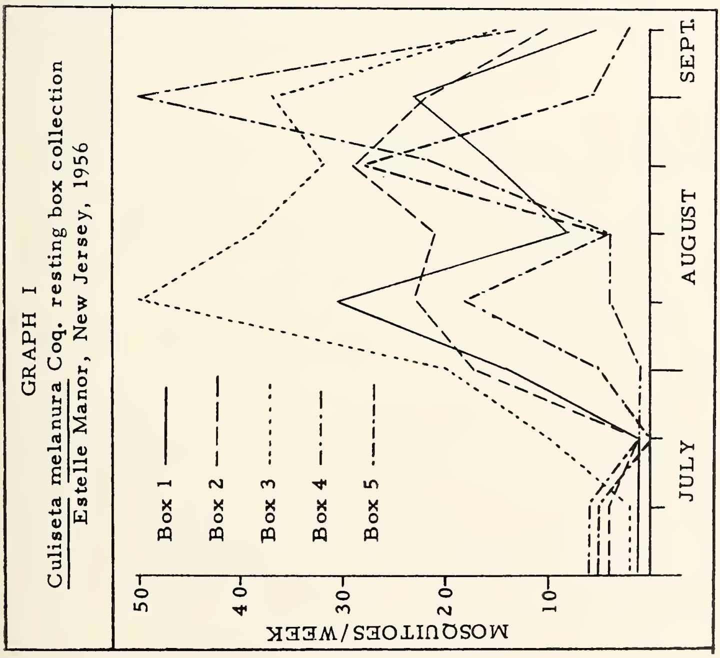
In 1956 the resting boxes were placed in the same positions as in 1955 and collection records were kept for each individual box. A light trap was also run in the same general area, about 100 yards from the nearest resting box. Light trap data were also obtained from various areas in South Jersey where according to existing collection records and larval sampling *C. melanura* was known to be present.

Graph I illustrates the *C. melanura* collections from 5 of the 7 resting boxes from July 5 to September 5, 1956. Although boxes 6 and 7 were noted early in the first season's study to be poorly situated for the collection of *C. melanura,* they were purposely left in this manner during 1956 to check the earlier finding. Boxes 4 and 5 were on a small strip of land situated in the swamps proper and apparently were not ideally located. These two boxes failed to produce any *C. melanura* 12 and 13 times, respectively, out of the 29 inspections. Boxes 1, 2, and 3 appear to have been somewhat better situated. These were placed on the ground in a stand of pine growth having a typically clean forest floor covered mainly with pine needles. This pine growth area was between the swamps and a large bird farm. Since *C. melanura* is now known to feed heavily on birds (DeFalco and Burbutis, work in progress), this might possibly account for the higher numbers being found in these three boxes; viz., boxes 1, 2, and 3 were more often encountered by these mosquitoes since they were placed in the flight path more frequently used by them. These three boxes failed to produce *C. melanura* specimens only 6, 4, and 2 times respectively out of the 29 inspections.

Graph II shows the light trap collections of *C. melanura* from four different areas in South Jersey, encompassing the same period of time, July 5 to September 5, 1956, that the resting boxes were inspected. According to these light trap collections, in all four of these areas *C. melanura* adults were present in relatively large numbers during 1956. For the most part there appears to have been two definite adult peaks, one during the last week of July and the first week of August, and the other during the latter part of August. Six out of the seven resting box collections also show these same two adult peaks to a greater or lesser degree depending on the numbers that were attracted to the individual boxes (Graph I). The seventh box (No. 4) when viewed separately did not show the late July-early August adult peak, but did very definitely show a large increase in adults during the late August period. Even though boxes 6 and 7 (not illustrated) only produced 40 and 16 *C. melanura,* respectively, out of the 29 inspections, they nonetheless definitely showed increases in the adult populations at approximately the same time that the larger light trap collections did.



GRAPH II
Culiseta melanura Coq. light trap collections
New Jersey, 1956



GRAPH I
Culiseta melanura Coq. resting box collection
Estelle Manor, New Jersey, 1956

Discussion and Summary

Preliminary studies on the use of a diurnal resting box, similar to the one described by M. H. Goodwin (1942) for *Anopheles quadrimaculatus,* as an added means of collecting live specimens of *Culiseta melanura* in New Jersey has been described.

It was found that these boxes were rather specific in attracting both *C. melanura* and *Anopheles* species. More *C. melanura* were attracted to these boxes when they were placed on the ground and the openings faced in a westerly direction. Since 5 of the seven boxes were placed in this manner, and since they were all constructed alike, it is logical to assume that each of these 5 boxes was equally attractive to these mosquitoes. The differential in collections is probably a function of placement of the boxes within the restricted ecological habitat of this species.

Most of the mosquitoes apparently entered the resting boxes sometime between 8 and 9 A. M.

Besides providing a good qualitative adult survey technique for *C. melanura* these boxes may be used to locate certain optimum collection sites, and rather large numbers of live specimens may be collected.

Furthermore, it was shown that the boxes can give a good indication of population fluctuations (seasonal distribution) of *C. melanura* and may be placed in areas that are not easily accessible for the conventional light trap collection technique.

Literature Cited

Burbutis, P. P. and Jobbins, D. M. 1957. *Culiseta melanura* Coq. and Eastern Equine Encephalomyelitis in New Jersey. Proc. 44th Ann. Meet. N. J. Mosq. Exter. Assoc.: 68–78.

Carpenter, S. J., Middlekauff, W. W., and Chamberlain, R. W. 1946. The mosquitoes of the Southern U. S. East of Oklahoma and Texas. Amer. Midl. Nat. Mono. 3: 292.

Goodwin, M. H. 1942. Studies on artificial resting places of *Anopheles quadrimaculatus* Say. Nat'l Malar. Soc. Jour. 1: 93–99.

The Eleventh International Congress of Entomology will be held in Vienna from August 17 to 25, 1960. Further information will be sent immediately to any interested persons who have not yet received a circular letter, if they will contact the Secretary of the Congress (Vienna I., Burgring 7) by post card as soon as possible.

TWO NEW NEOTROPICAL MICROVELIAS (VELIIDAE: HEMIPTERA)

By Carl J. Drake, Smithsonian Institution, Washington, D. C.

The present paper contains the descriptions of two South American water-striders of the genus *Microvelia* Westwood. The types are in the Drake Collection (U.S.N.M.). In the structural measurements, 80 units equal one millimeter.

Microvelia arca, n. sp. (Fig. 1)

Apterous form: Color very variable, ranging from almost entirely testaceous to nearly totally black, with numerous gradations of color markings between these two color forms. Pronotum in pale form often black with two large pale spots (1 + 1) or a transverse stripe in front and sometimes posterior margin also brownish testaceous; abdomen above with blackish areas; body beneath brownish testaceous to almost black; legs brownish testaceous with tips of femora, tibiae and tarsi dark brownish or infuscate. In blackish form, body beneath and legs also black. Antennae dark fuscous with concolorous pubescent hairs. Macropterous form unknown. Length (male) 2.40 mm. and (female) 2.65 mm.; width (male) 0.75 mm. and (female) 0.80 mm.

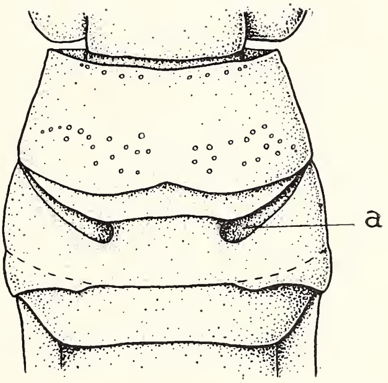


Fig. 1. *Microvelia arca,* n. sp., male: outline of pro- meso- and metanotum and sulcate furrows (1 + 1) of metanotum (*a*).

Head moderately convex above, with median longitudinal line impressed, black and shining. Antennae rather densely pubescent but without long hairs, rather slender: measurements; I, 24; II, 16; III, 30; IV, 40. Legs slender, unarmed and straight in both sexes. Venter without spine or tubercle. Pronotum slightly depressed, produced posteriorly and concealing a large part of mesonotum, excavated behind, with transverse rows of pits on hind lobe as in illustration (Fig. 1), collar also set off by a transverse row of pits. Mesonotum very short, with lateral regions convexly rounded posterior and then jointly rounded with posterior margin. Metanotum longer than mesonotum, with a deep lunate or arcuate furrow on each side of middle third just back of the hind margin of mesonotum (Fig. 1, *a*.)

Abdomen 0.72 mm. long, with tergites slowly and very little narrowed posteriorly, tergite VII longer than the preceding; connexiva moderately wide, widest near middle, with exterior margin forming a convex line, only a little narrowed apically, reflexed obliquely upward laterally in both sexes, slightly wider in female than in male. Male genital segments rather small, without a pair of lateral spines; first segment above rounded at apex, beneath very deeply and broadly rounded excavated. Legs long, slender, unarmed; anterior tibiae with prominent apical spur; tarsal segment I slightly shorter than II.

Holotype male and *allotype* female, both apterous and largely testaceous in color, Linha Facao, St. Catarina, Bras., May, 1957, F. Plaumann. *Paratypes:* 48 specimens, quite variable in color, some almost black, same data as type.

Very variable in color, testaceous to almost entirely black. Separated at once from brachypterous forms of all other American species of the genus by the wide, deep, lunate furrows of metanotum as shown in Figure 1*a*. The color of the furrows varies from testaceous to black and is very shiny.

Microvelia potama, n. sp.

Brachypterous form: Velvety blackish fuscous to black-fuscous with anterior part of pronotum rufous brown; abdomen above bluish black with connexiva somewhat reddish brown, also tinged with bluish; body beneath black. Pubescent hairs on dorsal surface blackish on pronotum, longer and grayish yellow on abdomen, the hairs on upper part of lateral sides of thorax and abdomen much longer and black. Antennae blackish fuscous with basal segment often largely stramineous or brown, the short dark pubescence of last three segments interspersed with fairly long hairs. Legs moderately stout, stramineous with dorsal surface of femora, tibiae and tarsi fuscous to blackish fuscous. Length 1.80 mm. (male) and 2.30 mm. (female); width 0.60 mm. (male) and 0.82 mm. (female).

Head with a median, longitudinal, impressed, black line; labium stramineous or fuscous with terminal segment black, extending to nearly middle of mesosternum. Antennae rather slender, moderately long: measurements; I, 15; II, 14; III, 17; IV, 22. Pronotum large, covering mesonotum, evenly slowly rounded behind, quite velvety in appearance with punctures pretty much concealed by pubescence, without median carina, wider behind than long (male 34:44; female 35:50). Metanotum with color and dorsal surface very much like that of abdominal tergites. Abdomen with tergites slowly narrowed backwards (VII about two-thirds as wide as II); connexiva widest near middle, with outer edge forming a convex line, turned obliquely upward laterally, wider in female than in male but not more reflexed and also widest near middle. Legs fairly stout, unarmed in both sexes, pubescent, all tibiae with a longitudinal row of long, black hairs on outer face, first tarsal segment slightly shorter than second. Legs shorter in male than female and with the femora slightly more swollen, especially anterior pair; anterior tibiae with an apical spur.

Female distinctly larger and stouter than male, with color, markings and vestiture as in male. Male genital segments small, without lateral projections, first segment beneath deeply roundly excavated. Alate adult unknown. Nymphs of last three instars taken in numbers with adults and are represented by both apterous and macropterous forms; fifth instar nymphs have long wing-pads. Tibiae of adults straight in both sexes.

Holotype male and *allotype* female, both apterous, taken near the bank in the sluggish parts of a river about 35 miles northeast of Santa Cruz, Bolivia, Oct. 23, 1957. *Paratypes:* 40 males and females, netted at same time and place as type, all collected by C. Pinckert.

The color, markings and vestiture separate this pretty species at once from other Neotropical members of the genus. Most of the mature males were riding "pickaback" upon the females when netted and remained in this position preserved in alcohol. The pairs were not in copulation. The holotype and allotype are mounted on a rectangular point in pickaback position just as they were taken in the field. The male, which is much smaller than the female, holds his pickaback position upon the back of the female by grasping her firmly (just behind the eyes) on the anterior part of the pronotum with his anterior pair of legs. The other legs also aid in the ride.

SOME NEW SPECIES OF THE GENUS BATHYPOGON LOEW (DIPTERA: ASILIDAE)

By Frank M. Hull, University of Mississippi

This paper describes some new species of flies of the genus *Bathypogon* Loew. This genus is a conspicuous element of the Australian fauna and appears to replace the genus *Stenopogon* Loew of the Holarctic region. The types are in the South Australian Museum; paratypes, where available, are in the author's collection.

Bathypogon ophiurus, n. sp.

A small species characterized by the dark, sepia brown color, the black mesonotum, with humerus and lateral margins dark, reddish brown. The face is pale brown in ground color, the first antennal segment is pale brownish yellow. The color of the bristles is distinctive. Those on the upper part of the head and the anterior part of the mesonotum are distinctly brown in color. The tibial bristles and the tarsal bristles also for the most part are rather dark brown. Elsewhere the bristles are pale yellow. Hypandrium of the abdomen with triangular, bluntly pointed processes similar to those in *Bathypogon macrodonturus* Hull. Length 13 mm.

Male. *Head:* The occiput and front black in ground color, the upper occipital bristles and front and vertical bristles dark brown, its pubescence and the lower pollen of the front pale brownish yellow. Supraoccipital bristles and upper frontal pollen reddish to golden brown. The first segment of the antenna is quite pale brownish yellow; the second and more than the basal third of the third segment light brown; the remainder of third segment rather strongly dilated and brownish black with short, stout style.

Thorax: The thorax is black. The humerus and lateral margin and a wedge-like vitta along the postdorsocentral bristle row are dark brown. The central pollen is pale reddish brown, becomes greyish yellow laterally and the pleural pile is the same color. The pleuron is quite dark reddish brown and is nearly blackish on the anterior part of the mesopleuron and sternopleuron. The thoracic complement of bristles includes 1 posthumeral, 2 notopleural, 1 supraalar and 3 postdorsocentral elements, all of which are dark brown, 2 postalar and 2 scutellar pairs of bristles, which are pale yellow. Metapleural bristles pale yellow with 3 weakly differentiated bristles among the long hairs. The pollen on the mesonotum is pale yellowish brown, still lighter and nearly white with a greyish yellow cast on the sides of the mesonotum, on the sides of the scutellum, on a postdorsocentral stripe and on the pleuron.

Wings: The wings are nearly hyaline, the veins dark brown throughout, the lower end vein of the discal cell makes a strong angle with the end vein of the fourth posterior cell. Apex of wing not conspicuously darker.

Legs: The legs are moderately stout and brown in color, rather dark and on the anterior surfaces of anterior and middle femora quite dark brown. Lateral surface of hind femur nearly black. All of the tibiae dark brown, a little lighter posteriorly. Tarsi dark brown. Bristles of the legs dark brown. On the tibiae the bristles are dark brown, except for a pale, yellow bristle posteroventrally on the middle of the posterior surface of all pairs, 2 pale bristles anteriorly on the middle tibia and 3 at its apex and 1 basal and 1 subapical, pale bristle on the hind tibia. The bristles of the femora are all pale yellow, except at the apex of the hind femur and middle femur, where they are, with one exception, brown. Pile of legs, including the coxae, is white and the pollen of the coxae is conspicuously white.

Abdomen: The abdomen is sepia brown, almost black dorsally, with dark inconspicuous, golden brown pollen, which is rather thin. The sides of the tergites are lighter brown in color, slightly reddish, with pale, yellowish grey pollen. Terminalia quite dark sepia brown, but not quite black. The hypandrium has ventrally a pair of triangular, thin, bluntly pointed teeth, quite similar to those of *Bathypogon macrodonturus,* the latter differing in color and in quite different processes on the apex of the superior forceps.

Holotype male, from Flinders Island, South Australia, collected by T. D. Campbell.

Bathypogon bidentatus, n. sp.

A moderately large species, which is entirely black in ground color, except for the largely reddish terminalia. Obviously related to *Bathypogon hamaturus* Hull; the terminal protuberances, while conspicuous, are quite different. Like *Bathypogon hamaturus* the bristles everywhere are pale, brownish yellow. Length 19 mm.

Male. *Head:* The ground color of the head is everywhere black; pollen of occiput centrally grey; along the eye margins greyish yellow; on the front, vertex and face pale brownish yellow. All bristles and pile pale, except those of the ocellarium, which may be a little darker. First 2 antennal segments brownish black with pale, brownish yellow, bristly pile. Third segment absent.

Thorax: The thorax everywhere black, the pollen on the central part of the mesonotum is dark brown, on the lateral margins and pleura it is pale, greyish to brownish yellow. The complement of mesonotal bristles includes 1 posthumeral, 3 notopleural on 1 side and 4 on the other side, equally long and stout; 1 supraalar, 2 postalar, 2 pairs of scutellar bristles and 3 postdorsocentral bristles. Metapleuron without strongly differentiated or isolated bristles.

Legs: The femora are wholly black. Anterior tibia black, its tarsi brownish black. Claws red on the basal third and comparatively blunt. Other tibiae and tarsi missing. Pile and bristles of the legs light brownish yellow.

Wings: The wings are nearly hyaline with faint, brownish cast. Veins light reddish brown. Lower end vein of discal cell and of fourth posterior cell aligned.

Abdomen: The abdomen is black with thin, dark pollen dorsally and pale yellowish grey pollen laterally. Posterior margin laterally on the second to fourth tergites, as in *Bathypogon hamaturus* contrastingly covered with light brownish yellow pollen. Terminalia medium red on the basal half of the dorsal forceps. The terminal portion is dark reddish brown, except on the processes, which are lighter in color. The whole hypandrium is light reddish brown. The strong, ventral protuberances of the hypandrium are similar in general style to *Bathypogon hamaturus* but instead of being truncate and laterally excavated, they are a little flared or dilated distally with open, posterior, cup-like depressions arising as 2 teeth-like, apical points.

Holotype male, Bowen, Queensland, collected by A. Simpson. No date given.

Bathypogon rufitarsus, n. sp.

Characterized by the bright, wholly pale, orange tibiae and tarsi. The femora are extensively orange also. There is a large, medial triangle of orange lying beside the humerus. The first 2 antennal segments and base of third antennal segment orange. All bristles deep brownish yellow. Last 4 tergites of abdomen brownish red. Males without conspicuous processes. Length 14 mm.

Male. *Head:* The ground color of the face is pale yellowish brown; of the remainder of head black. Vertex and front with reddish brown pollen and pale, reddish or brownish yellow bristles. Bristles of face, the lower occipital pile and palpal pile and pubescence of face, and the antennal bristles all deep, reddish yellow. First 2 antennal segments light brownish orange, the basal third or more of the third segment similarly colored, the remainder of the third segment sepia brown and nearly black in color.

Thorax: The mesonotum is narrowly black down the middle and this medial, black area narrowly separated by red from the wide, sublateral, blackish vittae. These sublateral, black stripes a short distance behind the humeri are widely separated from the lateral margin and end as a blunt, triangular wedge near the anterior margin of the postalar callosity. The medial stripe is narrowly continued almost to the scutellum. The humerus, the wide lateral margin, postalar callosity, whole of the scutellum, all of the area in front of the scutellum, except the medial black vitta, light orange brown or brownish red. There is a large, red spot medial and adjacent to the humerus. The anterior extension of this reddish color along the dorsocentral bristle row is rather wide and distinct. Pollen of mesonotum reddish yellow. Pleuron almost wholly pale orange brown with blackish spot in the center of the mesopleuron and a dark brown spot anteriorly on the sternopleuron. All thoracic bristles reddish yellow, and of the typical number for the genus, i.e. 12 pairs for the mesonotum and scutellum.

Legs: The legs entirely bright orange on the tibiae and tarsi, except an obscure, darker brown stripe along the lateral surface of the hind tibia. Femora similarly orange but with the anterior surface of the anterior and middle femora and lateral surface of the hind femur black throughout. All pile and bristles of legs reddish yellow. Claws reddish brown on almost the basal half.

Wings: The wings are nearly hyaline but with a pale, dilute, reddish brown tinge due to the presence of villi. Apex a little darker. Lower end vein of discal cell makes a strong angle with the end vein of the fourth posterior cell. Veins light reddish brown.

Abdomen: The abdomen is dark, reddish brown dorsally with reddish brown pollen, the last 4 tergites a little paler in color, the lateral margins likewise light reddish brown. Pile and bristles reddish yellow, weak, except for 3 pairs on the sides of the first segments. Terminalia entirely light brownish red, the hypandrium with short, dorsal, inwardly turned extension and without ventral spine or process.

Female. Similar to the male, the tergites of the abdomen likewise reddish brown, especially on the last 4 tergites. The first 4 tergites are somewhat darker.

Holotype male, Mt. Serle, North Flinders Range, collected by Hale and Tindale; *allotype* female with the same data. These types are in the South Australian Museum. One *paratype* male with the same data in the collection of the author.

A DECUSSATED GYNANDROMORPH OF XYLOCOPA VIRGINICA (LINNAEUS) (HYMENOPTERA: APIDAE)[1]

By H. E. Milliron, Glen Dale, West Virginia

Under natural conditions, true gynandromorphism, of one type or another, is an uncommon phenomenon among insects. More of such cases have been recorded in the order Lepidoptera than in any other. In the order Hymenoptera, some bee genera, notably *Megachile, Androgynella* and *Xylocopa,* have furnished most of the examples. A different type of sex abnormality, referred to as intersex or sex intergrade, apparently occurs more frequently than gynandromorphism. A good example of the common occurrence of varying degrees of the latter kind of intersexuality is found in males of some species of ponerine ants.

The following remarks are confined to gynandromorphism in the genus *Xylocopa.* Those who may be interested in the phenomenon throughout the Hymenoptera are referred to general works by Dalla Torre and Friese (1899) and Enderlein (1913a), or to the more restricted treatments by Mitchell (1928) and Krombein (1949).

A specimen of the European *X. violacea* (L.), exhibited by Kriechbaumer in 1872, appears to be the first gynandromorphic *Xylocopa* of which we have any published record, and Maidl's (1912) description of an incomplete lateral gynandromorph of *X. micans* Lep. evidently is the earliest such reference to any North American species of the genus. Enderlein (1913a) published an account of a composite lateral-transverse gynandromorph of *X. mendozana* Enderl. and, in the same year (1913b), described what obviously appears to be nothing more than an intersexual example of *X. ordinaria* Sm., both from Argentina. More recently, gynandromorphs have been recorded for the following species: *X. confusa* Pér. from north Australia by Handschin (1935); *X. brasilianorum* (L.) from Argentina by Benoist and Berland (1935); and, *X. fenestrata* (F.) from India by Maa (1940). The gynandromorph reported here apparently is the first example for *X. virginica* (L.) which represents the second North American species in the genus. None of these abnormal xylocopids discovered anywhere to date represents a complete and true lateral gynandromorph. In the

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[1] The writer expresses his appreciation to Mr. Karl V. Krombein, U.S. National Museum, for reviewing the manuscript and checking proof.

majority of cases, the head and thorax, with their appendages, show the most marked effects, and clearly defined opposite sexual characteristics apparently are least expressed in the abdominal region.

Description of Gyandromorphic *X. virginica* (L.)

Head: Mouthparts are like those of the normal male. The left side of the head, including the antenna and compound eye, is female; the right side, including its antenna and compound eye, is male. The protuberance between the antennal bases, and that to the left of a mid-dorsal point on the clypeus are not as pronounced as those of a normal female, but developed well enough to represent the female dimorphic characteristic. The left posterior ocellus, removed from the eye margin by about twice its greatest diameter, is typically female; the right posterior ocellus is typically male, and is about as near the eye margin as one-half its shortest diameter (the median ocellus is alike in both sexes).

Thorax: Exclusive of appendages, the pubescence of this region is characteristic of the male. The median area of the disk is about as impunctate as in the female. All legs on the left side are typically male. The coxa and femur of the right front leg closely resemble those of a normal female, while the remainder of the leg is like that of the male, except that the tibia appears a little wider, the pubescence on it and on the tarsus is somewhat darker, and one of the inner tarsal claws is distinctly shorter than its paired outer claw. The middle and hind right legs are typically female. The shorter, more deeply infuscated right front wing and tegula are female, while the longer, less infuscated left front wing and its tegula are male (hind wings of both sexes are very much alike).

Abdomen: This region, consisting of six visible segments (normally six in the female, 7 in the male), is typically female above on the right side. The corresponding left side is male except that the weakly developed counterpart of spinose process on sixth tergite is present, and the seventh segment is invisible. The sixth sternite, which is entirely without trace of the median ridge characteristic of the female, approaches the normal male condition; otherwise, the abdominal venter appears undifferentiated on either side of the median line.

Genitalia: This structure, which is abnormally developed, especially the left side, plainly represents the female sex. The right side, with half of the eighth tergite, and the quadrate plate, approximates that of the normal female, but the first valvula is deformed beyond its ramus, and is broken off about two-thirds the distance from its anterior angle. The right second valvula is almost normal in shape, but the distal end is broken off, and the stem of the furcula is abnormally shorter and twisted to one side. The right third valvula appears to consist of two grown together, and is situated somewhat higher and more to the right than normally, while the corresponding left valvula is represented by a mere hairy stub or vestige. The left quadrate plate is smaller, noticeably distorted, and unlike the corresponding plate on the right. The left first valvula is entirely absent, and the second is much misshapen.

The specimen was captured by the writer on South Bass Island in Lake Erie, June 23, 1947. It and the slide bearing the genitalia are in the collection of the U.S. National Museum, Washington, D.C.

LITERATURE CITED

Benoist, R. and L. Berland. 1935. Trois cas de Gynandromorphisme chez les Hyménoptères aculeates. Arch. Mus. nat. Hist. nat. Paris, ser. 6, 12: 435–438.

Dalla Torre, K. W. v. and H. Friese. 1899. Die hermaphroditen und gynandromorphen Hymenopteren. Ber. d. Nat.-Med. Ver., Innsbruch 24: 1–96.

Enderlein, G. 1913a. Ein hervorragender Zwitter von *Xylocopa mendozana* aus Argentinien. Mit einem Verzeichnis aller bisher beobachteten gynandromorphen Hymenoptera. Stett. Ent. Zeit. 74: 124–140.

————1913b. Zur Kenntnis der Xylocopen Südamerikas und über einen Zwitter von *Xylocopa ordinaria*. Arch. f. Naturgesch. 79(Abt. A., h. 2): 156–170.

[Kriechbaumer, Joseph]. 1872. *In*- Vers. deutsch. Naturf. u. Aerzte, Leipzig (Tageblatt 45 der Versammlung-Zoologie), p. 137 [See under Gesellschaft].

Krombein, K. V. 1949. Two new gynandromorphs, with a list of previously recorded sexual aberrations in the Scolioid wasps. Proc. U.S.N.M. 100: 55–59.

Maa, T. C. 1940. On the monstrosity of certain *Xylocopa*-species (Hymenoptera: Xylocopidae). Lingnan Sci. Jr. 19(1): 83–85.

Maidl, F. 1912. Ueber einem Fall von lateraler Gynandromorphie bei einer Holzbiene (*Xylocopa micans* Lep.) Wien. Verh. Zool.-Bot. Ges. 62(h. 1): 19–26.

Mitchell, T. B. 1928 (1929). Sex anomalies in the genus *Megachile*, with descriptions of new species (Hymenoptera: Megachilidae). Trans. Amer. Ent. Soc. 54: 321–383, pls. 31–37.

A NEW PTILOMERA FROM THE PHILIPPINES (HEMIPTERA: GERRIDAE)*

By Herbert B. Hungerford and Ryuichi Matsuda

No true member of the genus *Ptilomera* has been recorded from the Philippines. Kirkaldy (1909) described a species as *Ptilomera luzonicus* from the Philippines, but placed it in a new subgenus *Rheumatogonus,* which is now recognized as a valid genus, thus leaving the Philippines still without a representative of this easily recognizable genus *Ptilomera.*

While the genus is distinct the separation of species is exceedingly difficult because of sexual dimorphism, occurrence of winged and wingless forms, and great individual variation in structures in both sexes. Some of these difficulties were mentioned by Dr. Esaki in his revision of the *Ptilomera* group (Eos, Revista Espanolo de Entomologia III, p. 258, 1927). However, he did no more than list the seventeen species known to him from the literature without making any of them recognizable and overlooked *Ptilomera aëllo* Breddin described in 1906 (Societas entomologica, XXI Jahrgang, April, No. 2, p. 9, April 15, 1906) from New Guinea. Then in 1933 Dr. Lundblad in his splendid "Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali" (Archiv für Hydrobiologie, Suppl. Bd. 12, Tropische Binnengewässer, IV, pp. 371–373, 417–429, 1933) discussed the variations quite fully and gave many illustrations. Of the seventeen species mentioned by Esaki, Lundblad examined the types of thirteen and concluded that there were no more than eleven valid species. He also overlooked *Ptilomera aëllo* Breddin, which would make twelve species in the genus if we accept his synonymy. Then in 1931 Esaki mentioned *Ptilomera shirakii* from Botel-Tobago Island, South Formosa, which escaped Lundblad's paper (1933). This appears to be nomen nudum. None of the descriptions thus far published would fit the description of the three males and one female we recently received from the Chicago Natural History Museum. This species stands quite apart from any other *Ptilomera* species known to us and comes from the Island of Palawan, West Philippines.

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* Contribution No. 1,000 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aid of a grant from the National Science Foundation.

Ptilomera werneri, n. sp.
(Pl. 1 and Pl. 2, A to E)

Size: Apterous males: 10.9 mm. to 12.6 mm. long; width of head across eyes 1.68 to 1.93 mm.; width across mesoacetabula 3.15 mm. to 3.78 mm. Apterous female: 11.55 mm. long; width of head across eyes 1.76 mm.; width across mesoacetabula 3.36 mm.

Color: Reddish brown above, pale testaceous beneath. Head with two oblique black spots between eyes, clypeus embrowned to black, antennae brownish black. Anterior margin of pronotum between eyes black, front femur with two longitudinal blackish bands. Mesopleura with two black bands separated by a silvery pile, middle and hind femora reddish brown, covered with short black setae; middle and hind tibiae darker.

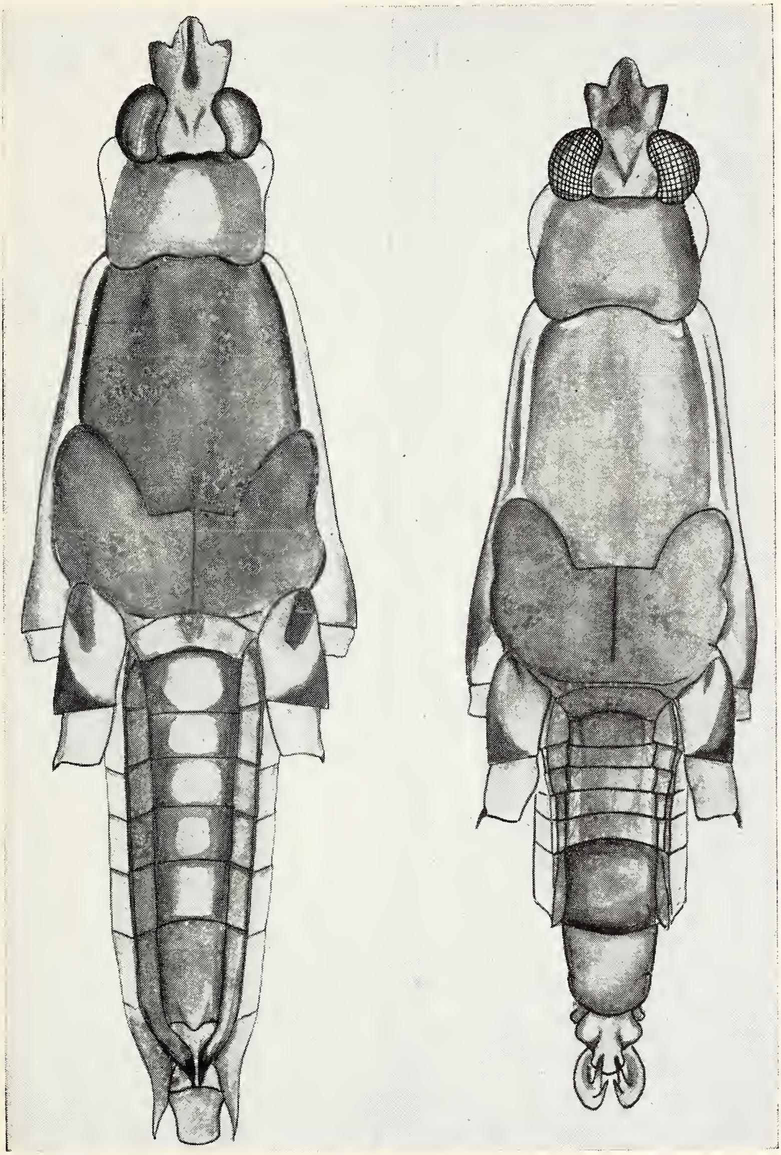
Structural characteristics: Antennal formula of male holotype: 1st : 2nd : 3rd : 4th :: 315 : 80 : 93 : 60; of allotype :: 240 : 60 : 73 : 50. Head a little longer than pronotum. Beak short, not reaching mesosternum. Male middle femur heavily ciliated ventrally on distal half, bare on basal half; tibia with adpressed hairs beneath. Middle and hind femora with many short black spicules above. Male suranal plate small, with very slight lateral lobes; pygophore with short dorsally directed lateral lobes, ventrally broad with a short caudally directed fingerlike tip. Paramere large, short and bifurcate at tip. Eighth segment of male ventrally with median longitudinal keel with depression on either side. Female with a dorsally directed protuberance on the tip of last abdominal tergite. Connexival spines short, stout, curved, with tips touching each other; upper lateral lobe short and broad; lower lateral lobe lacking; the shape of seventh sternite as shown in plate 2, fig. B and C.

TABLE I. **The relative lengths of leg segments of a male.**

	Femur	Tibia	1st tarsal seg.	2nd tarsal seg.	Total tarsal length
Front leg	340	310	160	63	223
Middle leg	990	575	265	26	291
Hind leg	1310	?	?	?	?

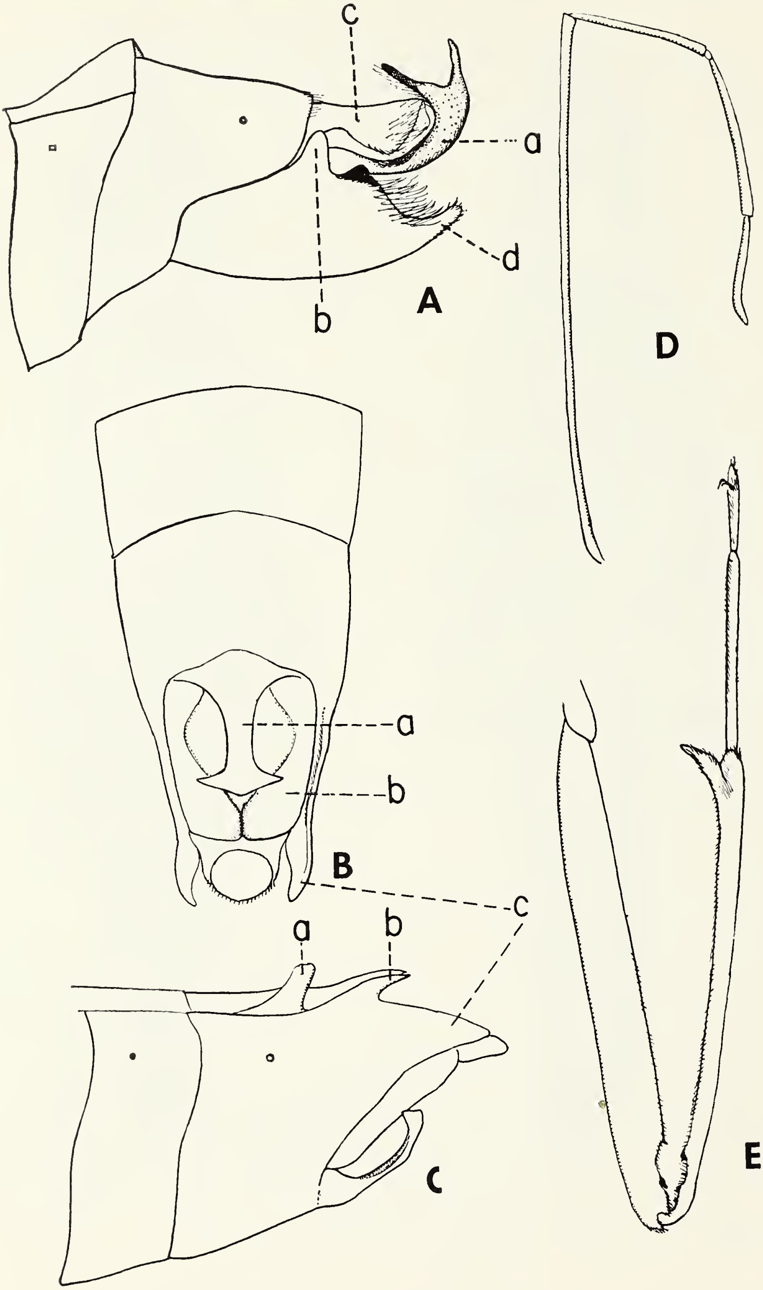
Location of types: Described from holotype, allotype and two male paratypes bearing the labels "Mountains w. of Lapulapu, Iwahig Penal Colony, Palawan Is. 2,000 to 3,000 ft. III: 1–2, 47" and "CNHM Philippines Zool. Expeditions (1946–1947) F. G. Werner leg.". The types are in the Chicago Natural History

HUNGERFORD AND MATSUDA PLATE I



Left. The female of *Ptilomera werneri* Hungerford and Matsuda.
Right. The male of the same species.

HUNGERFORD AND MATSUDA PLATE II


c
a
b
d
A
a
b
B
c
a
b
C
D
E

Museum except for one paratype in Francis Huntington Snow Museum, University of Kansas.

Comparative notes: This is the only known species of *Ptilomera* having a bifurcate male clasper and the unique seventh sternite in the female.

Explanation of Plate II

A. Lateral view of the male apical abdominal segments: a—The left paramere, b—Dorsally directed lateral lobe of the pygophore, c—The suranal plate, d—Finger-like tip of the pygophore. B. Ventral view of the female apical abdominal segments: a—Prolongation of the seventh sternite, b—lobe of the eighth segment. C. Lateral view of the male apical abdominal segments: a—Dorsally directed protuberance on the seventh tergite, b—The connexival spine, c—Upper lateral lobe of the seventh segment. D. The male antenna. E. The male front leg.

Tingidae are Biters: On a number of occasions, lace bugs have "bitten" me on the arms, hands, chest, neck, face, etc. Most of the irritating bites were made by the nymphs. Occasionally an adult bite has also produced definite irritation. On August 22, 1956, thousands of *Corythucha morrilli* Osb. & D. tingid bugs were swept from rabbit brush, *Chrysothamnus nauseosus,* north of Veyo, Utah. Foliage of the infested shrubs was being severely browned and damaged by this serious bug attack. It was hot and I was perspiring freely. The skin irritation from these bugs was severe and their biting persisted for some time. Hundreds of individuals were scattered over my clothing and skin. Similar annoyance was noted from this same tingid species at Kanab and Santa Clara in Utah, and at Fredonia in northern Arizona, when rabbit brush was swept for insects and the insect catch examined. On another occasion, while collecting very large numbers of tingids and aphids (*Macrosiphum eoessigi* K.) from heavily infested and damaged hollyhocks at Richfield, Utah, about 8:30 a.m., I was again severely bitten. The same experience was produced by tingids infesting *Quercus gambelii* foliage in Ogden Canyon, and elsewhere in Utah, on several occasions during summer of 1957.—George F. Knowlton, Logan, Utah.

SOME COMMENTS ON TABANUS LONGIUSCULUS HINE (DIPTERA: TABANIDAE)

By L. L. Pechuman, Lockport, New York

Hine described *Tabanus longiusculus* in 1907 from a series of specimens collected at Southern Pines, North Carolina and Mimmsville, Georgia. Since that time the species has also been reported from South Carolina, Florida and Tennessee. This species seems to be known mostly from the collection of occasional specimens and, as far as the writer can determine, no long series are known.

For this reason, a series of 30 specimens collected by Prof. R. L. Blickle of the University of New Hampshire in Indian River County, Florida in 1957 is of special interest. Single specimens were taken on May 23, 27 and 29 and June 7, 11 and 12. However, six specimens were collected on June 3, twelve on June 4 and six on June 5. Prof. Blickle advised me that all specimens were taken within a half mile radius in an area thoroughly surveyed from May 20 until July 15. Since all Tabanidae seen during this period were taken, or an attempt made to take them, it appears that *T. longiusculus* has a very short flight season. This may in part account for the absence of series of this form in collections.

Prof. Blickle has kindly given permission to quote from his field notes and these are of considerable interest. "This small species was taken in the pine woods west of the Old Dixie highway and just north of Oslo Rd., or was taken at the windows in the E.R.C. carports. One fly was taken as it attempted to feed on the observer's shoe. The observed flight habits of this species was of interest. They all were flying within three feet of the ground. If they flew around the observer they seldom got above the knees, or if they flew around the truck or jeep they were never higher than the tires. This suggests that this species feeds on some small animal which is in the woods or on animals living near the ground. Since these flies were found in this one area, or at the Ent. Res. Lab. carports and the woods did offer some shade it was suspected that this species was crepuscular in habit. These were not found outside of the pine woods during the morning or afternoon surveys".

Prof. Blickle's surmise that the species is crepuscular could easily be true since related forms such as *T. sackeni* Fairchild and *T. longus* O. S. are known to be crepuscular.

Through the kindness of Prof. J. N. Knull of The Ohio State University it was possible to study Hine's type series. Since all the specimens including one from Bostic, North Carolina, a locality not mentioned by Hine, were labeled "type", Prof. Knull requested that a lectotype be designated. A specimen from Southern Pines, N.C., 5 June 1907 is designated as lectotype and so labeled.

A comparison between the Florida series and Hine's North Carolina specimens shows some interesting differences. All of Hine's specimens except one 12.5 mm. long are 12 mm. in length. Only three of the Florida specimens are 12 mm. and one is only 8.5 mm. long; twenty of the thirty specimens are between 10 and 11 mm. When compared with the lectotype and other specimens from Southern Pines, the Florida series is more slender, the frons is narrower with the vertex somewhat hollowed, the sublateral abdominal spots are smaller and more distinctly outlined, the basal portion of the third antennal segment is dull yellow and there is a tendency for the wing membrane to be darker along the veins, reminiscent of the related *T. gracilis* Wied. The Florida series show considerable variation in the shape of the second palpal segment; in a few it is relatively slender at base and in one specimen it is greatly swollen. However, in most specimens the second palpal segment is moderately swollen as in the lectotype. Two other Florida specimens available for study (Norwalk and Gainesville) resemble the Indian River County specimens. The Bostic, N.C. specimen in the type series has a narrow frons as in the Florida specimens but resembles the lectotype in other respects.

In spite of the differences mentioned above, the writer feels fairly confident that the Florida material is *longiusculus.* The *"longus"* group of *Tabanus* is notorious for variations in characters which are relatively stable in many other species groups. Unless further evidence is forthcoming that *T. longiusculus* is composite, it seems best to leave it as now recognized.

PUBLICATIONS RECEIVED

The Beetles of the Pacific Northwest. Part II. Staphyliniformia, by Melville H. Hatch. ix + 384 pp., 37 plates. 7 × 10 ins, clothbound. 1957. University of Washington Press, Seattle. (Price, $7.00).

A NEW SPECIES OF ANOPLURA FROM THE PHILIPPINES

By Phyllis T. Johnson,[1] Washington, D. C.

Included in a collection of Anoplura from the 1946–47 Chicago Natural History Museum Expedition to the Philippines is a new species of *Polyplax* from *Bullimus*. The new louse species is described in this paper and compared with certain other species of *Polyplax* which infest rats related to *Bullimus* (*Bandicota, Nesokia,* and *Rattus s. strictu*).

I am indebted to Dr. Rupert L. Wenzel of the Chicago Natural History Museum for sending the collection for study.

Polyplax bullimae, n. sp.

(Figs. 5, 6, 8, 9)

Holotype male from *Bullimus bagobus,* Philippines, Davao Province, Mindanao, east slope of Mt. McKinley, 5400 ft., 20 August 1946, H. Hoogstraal collector, Field number 636, CNHM mammal catalogue number 56201. Three male *paratypes* bear the same data as the holotype. *Allotype* female, one male and two female *paratypes* bear data as the holotype except they were collected 19 August 1946 at 5500 ft., Field number 635, CNHM mammal catalogue number 56200. Holotype, allotype, two male and one female paratypes deposited in the collections of the Chicago Natural History Museum; two male and one female paratypes deposited in the collections of the United States National Museum.

Diagnosis: Superficially resembling *Polyplax asiatica* Ferris and *P. insulsa* Ferris. *P. bullimae,* n. sp., is like these two species in having the abdominal plates reduced and the head elongate and lacking postantennal angles. Both sexes of *bullimae* are separable from *insulsa* and *asiatica* in not having the dorsal apical seta of paratergal plates II and III greatly elongate, but with both apical setae of paratergal plate VI longer than the plate. The male is separable from *insulsa* and *asiatica* in that the pseudopenis articulates with the tip of the parameres in *bullimae* (Fig. 9), not with the parameres surrounding the pseudopenis (Figs. 3, 4); and further separable in that the third antennal segment is modified and bears a short stout seta. Female *bullimae* is separable from *asiatica* and *insulsa* in that paratergal plates III–VI do not have the ventral apical angle produced into a prominent lobe.

Description: Male (Fig. 6): *Head* elongate, lacking marked

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[1] Entomology Research Division, Agr. Res. Serv., U.S.D.A.

postantennal angles and not broadened behind antennae, gular region raised; antennae set well back from rounded apex of head; basal antennal segment not especially enlarged, third segment with distal angle produced and bearing a short, stout seta. Sensory pits of antennal segments 4 and 5 not contiguous. *Thorax* not as long as head; sternal plate with central portion irregularly triangular and sclerotized, outer rim semi-membranous, with anterior projection as in Fig. 8. *Legs:* Second pair of legs slightly larger than first, third pair much the largest. Pulvillus-like membranous lobe on inner margin of tarsi of first and second legs very prominent and discrete. *Abdomen* with narrow tergal and sternal plates; 1 row of setae per segment, except that ventrally segments 2 and 3 have 2 rows; dorsally with 2 or 3 setae laterally off the plates on each segment. Paratergal plates all poorly sclerotized; no apparent division in plate II; plates III–V with apical angles not produced, and bearing 2 short apical setae; plate VI similar but with apical setae longer than plate. *Genitalia* as in Fig. 9; pseudopenis narrow, longer than parameres and articulating with apices of parameres.

Female (Fig. 5): *Head* as in male except third antennal segment not modified. *Thorax* and *legs* as in male. *Abdomen* with 2 plates and 2 rows of setae per segment both dorsally and ventrally; plates greatly reduced, particularly the sternal plates and posterior tergal plate of each segment, these being interrupted, usually occurring merely as areas of sclerotization around each seta; one seta far removed laterally off plates on segments 3–7 both dorsally and ventrally. Paratergal plates as in male. *Genitalia* as in figure; genital plate large, poorly sclerotized; entire margin of vulva with delicate fimbriate processes, lateral setigerous lobes of the eighth segment (formerly called gonopods) suppressed.

Length: Male 1.0–1.2 mm., female 1.3–1.4 mm.

Comment on *Polyplax asiatica* Ferris and *P. insulsa* Ferris.

Ferris did not publish complete drawings of *Polyplax asiatica* in his original description (a figure of the male genitalia only was included). Further collections of *P. asiatica* represented in the United States National Museum make possible a more extended comparison of *P. asiatica* and *insulsa* than that given by Ferris. Complete drawings of both male and female *asiatica* are included in this paper to facilitate comparison with closely related species (Figs. 1, 2).

P. asiatica, although very close to *insulsa,* differs in the following ways: The head is at least one and one-half times as long as broad in both sexes of *asiatica;* but not in *insulsa.* The thoracic sternal plate is not so broad in relation to its length as in *insulsa.* The thoracic and abdominal spiracles are much larger in *insula* than in *asiatica.* Female *asiatica* lacks developed tergal and sternal plates except for vestiges on the most anterior part of the abdomen and the usual plates on the genital segments. Further, the prolonged ventral apical angle of paratergal plates III–VI is rounded in female *asiatica,* acute in *insulsa.* The male genitalia differ slightly, the parameres of *insulsa* being longer and not so strongly incurved apically as in *asiatica* (Figs. 3, 4). The two figures of the genitalia of *asiatica* illustrate how flattening of the specimen during mounting may change the apparent shape. Both specimens drawn were collected off *Nesokia suilla,* one from Faiyum Province and one from Beheira Province, Egypt.

Ferris noted in his original description of *insulsa* that both males and females have a small tooth-like projection at the outer proximal angle of the tarsus of the third leg. This projection is not visible on the male and female paratypes of *insulsa* in the United States National Museum (from *Epimys sabanus* [*Rattus sabanus*], Bunguran, Natuna Islands, USNM mammal catalogue No. 104765).

Blagoveshtchensky (1950) described *Polyplax turkestanica* from many specimens collected off *Rattus turkestanicus* from Stalinbad, Tadzhikistan, Russia. In the same publication he set up the subspecies *turkestanica major* based on large numbers of specimens from *Nesokia indica* taken at Stalinabad, and stated that in his opinion the females reported by Ferris as *asiatica* which were taken from *Nesokia hardwickii* (now known as *Nesokia indica*) from Baluchistan probably belonged to the subspecies *turkestanica major.*

Blagoveshtchensky apparently was misled by supposing that head shape was the same in *asiatica* as in *insulsa,* since he stipulated that his specimens had heads at least one and one-half times as long as broad as opposed to *insula* and *asiatica.* *P. turkestanica major*

EXPLANATION OF PLATE

Polyplax asiatica Ferris, 1923: Fig. 1, female (Egypt, Faiyum Province, *ex Nesokia suilla*). Fig. 2, male (Egypt, Beheira Province, *ex Nesokia suilla*). Fig. 3, male genitalia (Beheira Province). Fig. 4, male genitalia (Faiyum Province). Fig. 7, thoracic sternal plate, female (Faiyum Province).

Polyplax bullimae, new species: Fig. 5, allotype female. Fig. 6, holotype male. Fig. 8, thoracic sternal plate, allotype female. Fig. 9, genitalia, holotype male.

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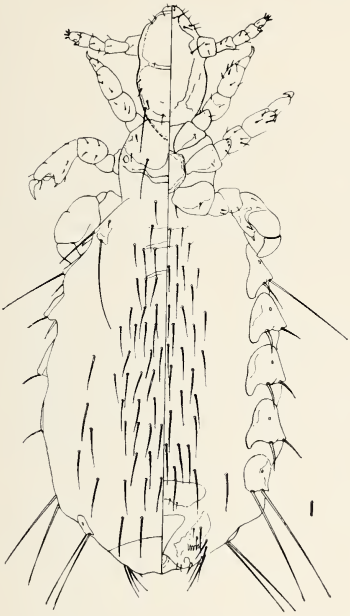
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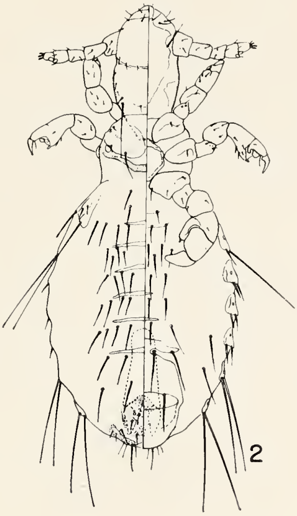
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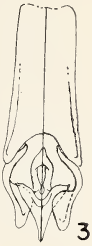
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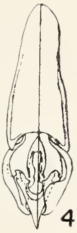
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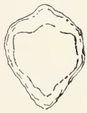
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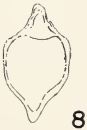
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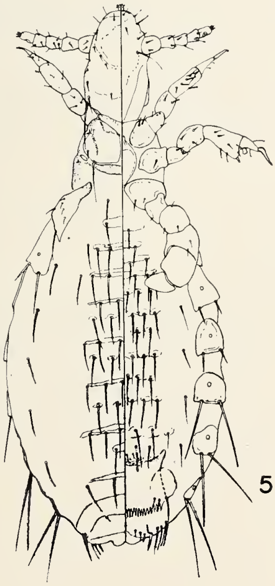
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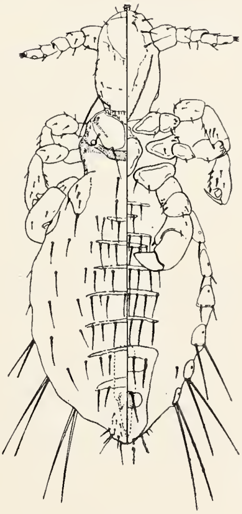
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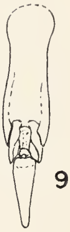
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was separated from the nominate subspecies by being usually somewhat larger and with a slightly longer head (total length: *t. turkestanica* ♂ 1.02–1.25 mm.; ♀ 1.4–1.8 mm.; *t. major* ♂ 1.41–1.59 mm.; ♀ 1.6–2.01 mm.).

In my opinion both *t. turkestanica* and *t. major* are synonyms of *asiatica* Ferris. Blagoveshtchensky's figures of the female paratergal plates, male genitalia, thoracic sternal plate and female dorsum of *t. turkestanica* are compatible with specimens of *asiatica* from Egypt and Baluchistan. Egyptian specimens of *asiatica* have total lengths of 1.0–1.05 mm. in the ♂ and 1.35–1.53 mm. in the ♀. The two Baluchistan females are 1.2 and 1.35 mm. respectively.

Four female *asiatica* in the United States National Museum collections, from *Bandicota* sp., Formosa, measure 1.6–1.75 mm., and differ slightly in the shape of the paratergal plates from the Egyptian, Baluchistanian and Tadzhikistanian specimens. The collection of larger series, including males, from Formosan *Bandicota* may prove these specimens not to be conspecific with *asiatica.* However, the slight differences exhibited in the present four females do not, in my opinion, warrant the assumption that they should be separated from *asiatica.*

Literature Cited

Blagoveshtchensky, D. I. 1950. Lice of synanthropic rodents of Tadzhikistan. Parasitol. Sborn. Zool. Inst. Akad. Nauk SSSR 12: 80–86, figs. 1–3. (In Russian).

Ferris, G. F. 1923. Contributions toward a monograph of the sucking lice. Part 4, pp. 183–237, Stanford Univ. Publ.

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Part II. Taxonomy, Evolution and Revision of American Genera and Species. 611 pp., 83 figs. 1954–56.	$15.00

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Vol. LIII OCTOBER, 1958 No. 4

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BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. LIII OCTOBER, 1958 No. 4

SOME MEXICAN AND COSTA RICAN MAYFLIES

By Jay R. Traver, University of Massachusetts

Specimens described in this paper have come to me from several different sources. The Costa Rican ones were collected by Mr. D. L. Rounds. Those from Mexico were presented by Dr. Lewis Berner of the University of Florida, and Dr. Stanley Mulaik of the University of Utah.

Genus *Leptohyphes* Eaton

Eyes relatively small and remote, in both sexes. Fore wing widest in region of MA-MP; no prominent cubito-anal lobe as in males of *Tricorythodes;* cross veins more numerous than in that genus, ranging in number from 43 to about 136 in area behind R_1; CuP strongly arcuate. Hind wing present in male, in most species absent in female; no cross veins, usually but two longitudinals; costal angulation prominent, usually long, slender, somewhat arcuate. Membranous processes from wing roots extend beyond mesonotal scutellum, in most species. Claws on fore leg of male dissimilar in some species, similar in others; dissimilar on all legs of female and on second and third leg of male. Fore tibia of male two to three times length of femur. Subanal plate of female very slightly emarginate apically. Three principal types of male genitalia. Tails three, in both sexes. Type of genus: *L. eximius* Eaton.

In the four species here described, hind wing absent in female; membranous processes present; cross veins in fore wing quite numerous (70–82 behind R_1 in male, up to 100 in female).

Leptohyphes sabinas, sp. nov.

Synopsis: fore claws of male dissimilar; genitalia of the *peterseni* type (see Figs. 4, 5).

Species represented by: one male which has almost completely

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shed the subimaginal cuticle; one female imago; 7 male and 9 female subimagos many of which have begun to shed the cuticle: in alcohol.

Size: Male; body 4 mm., fore wing 4½ to 5 mm. Female; body 4½ mm., fore wing 5½ to 6 mm.

Male: holotype (cuticle almost completely shed). Head blackish or purplish black; antennae pale. Pronotum blackish with reddish tinge; pale areas include median and submedian streaks and five or six oval spots on each side arranged around black lines. Margins black. Prosternum yellowish gray, anterior half with dark shading. Mesonotum quite dark reddish brown, contrasting with adjoining anterior and lateral pale streaks; scutellum lightly shaded with blackish; membranous processes gray. Gray shading on pleura above and anterior to each leg. Mesosternum dark red-brown, central sclerites outlined with black, and shaded with purplish black interspersed with tiny pale dots. Metanotum somewhat paler than mesonotum; outlined narrowly in black. Two reddish brown spots at apex of each trochanter. All femora reddish brown, washed and streaked with purplish brown, which tends to form diffuse preapical bands; apex widely pale. Fore femur with blackish brown anterior margin and longitudinal streak. Fore tibia purplish black, paler at extreme apex; very pale reddish brown at base, so that knee is pale. Tibiae of other legs yellowish white, shaded with pale gray near middle. Fore tarsus gray, basal joint whitish, distal joint pale gray, joinings pale. Other tarsi pale yellowish white.

Membrane of fore wing very faintly tinted with pale fawn-color; veins reddish brown; all cross veins behind R_1 fairly distinct; humeral cross vein and C and Sc preceding it, grayish brown. Membrane in basal half of costal margin somewhat more deeply tinted; longitudinals here deeper in color; apical half paler, opaque. 78–80 cross veins behind R_1. Basal area of hind wing as far as oblique upright vein, and including costal projection, tinted faintly with fawn-color. Middle abdominal segments partially translucent, pale yellowish; apicals opaque, pale reddish brown; much gray shading. Wide transverse gray bands occupy most of each tergite, leaving pale lateral areas and a pale band adjacent to posterior margin, which is narrowly black; on basal and middle segments, dark bands tend to form a row of darker blotches next to pale lateral area. Narrow pale discontinuous middorsal line on tergites 1–7; obsolescent on 8 and 9; on 10, replaced by narrow geminate black line. Narrow dark dashes along pleural fold. Gray shading on sternites tends to be arranged in three longitudinal rows; i.e., narrow blotches laterally near pleural fold, and a central area, where narrow dark gray submedian streaks surround pale ganglionic spots; small pale dots on each side of submedian streaks. Tails dark gray, not darker at joinings. Have not yet attained full length of imaginal stage.

Female imago: Slightly stouter than male. Abdomen yellowish, filled with eggs. Head and pronotum more blackish than in male. Wings and legs much as in male. About 93 cross veins behind R_1. Meso- and metathoracic shading darker than in male. Tails paler gray. Subanal plate extends as far as apex of 10th tergite.

Subimagos: Do not differ greatly from descriptions above, except for their more teneral condition; the duller wings do not as yet show color in the veins. Three of the females are darker than the allotype.

Holotype male (cuticle partially shed), Sabinas Hidalgo, Park Chapultepec, Nueva Leon, Mexico, Dec. 16, 1940 (H. H. Hobbs, Jr.). Specimen in private collection of J. R. Traver. *Allotype* female imago, same data. In collection of J. R. Traver. *Paratypes:* 7 males and 9 female subimagos; same location, Dec. 16 and 17, 1940; same collector. Two males and two females in collection of Dr. L. Berner, who sent me the specimens; others in private collection of J. R. Traver.

Dr. H. H. Hobbs Jr., collector of these specimens, sent the following field notes to Dr. Berner: "Sabinas Hidalgo, Park Chapultepec, Nueva Leon. Warm stream (21.5 C.); rapid current flowing over rocky bottom. Stream issues from two caves. *Chara, Hydrocotyl* and filamentous algae abundant. Nymphs from beneath stones. Mayflies emerging by the hundreds." Dated Dec. 16, 1940.

It seems very probable that it is this species, *sabinas,* which Burks (1953) records as occurring around the lights in San Antonio, Texas. I was permitted to examine these Texas specimens, and made rather careful notes while studying them. I find that these notes correspond very well with specimens of *sabinas.* The range of this species may thus be extended into Texas. As far as I know, Burks' paper is the only published record of the occurrence of *Leptohyphes* in the United States. However I have in my collection nymphs from the Savannah River in South Carolina, taken by Mr. Thomas Dolan IV, which seem to be of this genus.

L. sabinas appears very similar to *nigripunctum* Traver from Venezuela. However, the blackish head and pronotum, dark brown mesosternum, reddish brown femora and dark gray tails of *sabinas* contrast with the grayish head, whitish pronotum, dark gray mesosternum, yellow femora and whitish tails of *nigripunctum. L. sabinas* likewise resembles *peterseni* Ulmer from Brazil; this latter species (from original description) has yellowish brown thoracic nota, and a more marked tendency toward formation of several rows of dark blotches on abdominal segments. Perhaps *sabinas* might be considered the northern counterpart of *peterseni.*

Leptohyphes berneri, sp. nov.

Synopsis: fore claws of male similar, blunt (see Fig. 6); genitalia of the *peterseni* type; thorax unusually deep and large.

Species represented by: 23 male imagos and 8 female imagos. One female and two males are mounted entire, others in alcohol. Specimens had been dried before immersion in alcohol, and abdomens of all are much shriveled.

Size: Male; body 2½–3 mm. (shrunken), fore wing 3½–5 mm., tails 9–13 mm. Female; body too shrunken for accurate measurement, fore wing 6–6½ mm., tails 6 mm.

Male imago: holotype. Head light reddish brown; posterior and lateral margins, frontal carina, and two submedian streaks, black. Eyes black. Antennae yellowish; black dot at apex of second joint. Pronotum reddish brown, margined and shaded with grayish black. Meso- and metathorax light reddish brown; mesonotal shield hardly deeper in color than adjoining areas; both scutella and lateral margins preceding these, heavily shaded with blackish; paler area precedes mesonotal scutellum. Narrow oblique black marks above leg bases. Mid-region of anterior half of mesosternum sooty gray, some gray banding also on mid-areas of remainder of thoracic sternum. Femora yellowish to pale reddish brown; blackish somewhat triangular pre-apical spot and basal blackish longitudinal streak, these markings most distinct on second and third legs. Fore tibia pale smoky gray, still paler at base; tarsus paler gray, darker distally; tibiae and tarsi of other legs yellowish, outer margins of tibiae narrowly reddish brown; knees dark red-brown; all trochanters light reddish brown.

Wing membrane pale fawn-colored; veins pale reddish brown, cross veins finer than longitudinals but most are easily visible; membrane of basal half of costal margin, and Sc and R in this area, deeper in color; humeral cross vein and space preceding it, likewise darker red-brown. 70–73 cross veins behind R_1. Hind wing as in Fig. 2; costal projection and area of membrane preceding the upright vein tinted with fawn-color. Abdomen pale reddish brown. Heavy blackish transverse bands on basal and middle tergites, leaving pale anterior and lateral margins; apical tergites with narrow black lateral and posterior margins; median black streak on 9 and 10. Sternites somewhat paler than tergites; pale grayish band occupies middle of each segment. Interrupted black dashes next to pleural fold faintly indicated. No other markings determinable. Tails yellowish white, not darker at joinings. Genitalia pale reddish brown (see Fig. 4).

Female imago: allotype. Larger and stouter than male. Black markings on thorax and abdominal tergites more pronounced; wing membrane and veins of costal area more deeply tinted; 93–100 cross veins behind R_1. Legs rather darker reddish brown than in male; black femoral markings more distinct; tibiae of second and third legs with narrow gray longitudinal streak composed of minute blackish freckles set close to gether.

Holotype: male imago, Metlac, Mexico, Dec. 25, 1940 (H. H. Hobbs Jr.). Specimen in private collection of J. R. Traver. *Allotype:* female imago, same data. *Paratypes:* 22 males and 8 females, all imagos, same data; 3 males and 2 females in collection of Dr. L. Berner, for whom the species is named.

The following notes on the locale of this species are recorded by Dr. Hobbs: "Clear swift stream at Metlac, State of Orizaba (?). Origin of stream in snowfield of Mt. Orizaba. Very cold water. . . . Late in P.M. (of Dec. 25, 1940) just before dark they emerged from rapids by the thousands."

The similar blunt fore claws of the male place *berneri* in the same group as the two species following; brief notes on the distinguishing features of these three species follow the descriptions.

Leptohyphes zalope, sp. nov.

Synopsis: fore claws of male similar, blunt; genitalia of the *peterseni* type.

Species represented by: 9 male imagos (two mounted, others in alcohol).

Size: Male; body 3–3½ mm., fore wing 4¼–4½ mm., tails 11–13 mm.

Male: holotype (mounted on slide, with one paratype; wings present on holotype). Head dark red-brown above, heavily shaded with black; black bands from median to lateral ocelli and across back of head between ocelli. Antennae yellowish white. Pronotum rather dark red-brown, heavily shaded and margined with blackish. Mesonotum bright chestnut brown, wide slightly paler median stripe; scutellum gray-shaded, bordered and preceded by paler areas. Metanotum paler red-brown, grayish black laterally; dark streaks and shading on thoracic pleura around bases of legs. Thoracic sternum dark red-brown, paler transverse band between meso- and metasterna. Fore leg deep smoky gray; three dark gray longitudinal bands on femur, composed of closely placed tiny dark dots; paler streaks between dark bands; pre-apical band. Tibia darker than femur, pale at base so that knee is pale reddish brown; tarsus paler than tibia, joinings narrowly paler. Other femora pale reddish brown, gray-streaked and with faint pre-apical bands. Tibiae yellow with faint red-brown tinge; a few small dark dots near mid-area; tarsi yellowish; all coxae reddish brown with some dark shading, one darker dot an anterior angle. (Third leg missing from holotype; described from a paratype).

Membrane of fore wing faintly but distinctly fawn-colored, deepest along costal strip; veins light red-brown, cross veins almost as distinct as longitudinals; 72–78 behind R_1. Pale ground color of abdomen almost obscured by heavy dark gray bands; apical segments distinctly tinged with reddish brown. Posterior margins of tergites *very narrowly* blackish; deep smoky patches on each side near pleural fold; mid-dorsal line pale margined by interrupted black streaks. Sternites with faint brownish tinge added to gray banding; pale gray mid-ventral streak bordered by short black submedian lines ending in small white dots; anterior margins of basal and middle sternites white on each side of gray mid-line; dark gray patches border pleural fold on sternites 2–6; on sternites 1 and 2, black dash on pleural fold. Tails pale slate gray; most segments very narrowly pale at base and even more narrowly darker at apex, giving a dot-and-dash appearance. Genitalia yellowish; distal joints of forceps missing, from all specimens.

Holotype: male imago (mounted on slide). Taken four miles south of the Rio Papagayo Bridge on the Rio Zalope, Mexico, January 4, 1948 (Dr. S. Mulaik). Specimen in private collection of J. R. Traver. *Paratypes:* 8 males; one mounted, others in alcohol; same data. It is perhaps worth noting that in some of the paratypes the pronotum is dark slate gray rather than reddish brown as in the holotype.

Leptohyphes priapus, sp. nov.

Synopsis: fore claws of male similar, blunt; genitalia of the *peterseni* type.

Species represented by: 25 male imagos; two mounted on slides, others in alcohol.

Size: Male; body 4–5 mm., fore wing 5–5½ mm., tails 10–14 mm.

Male imago: holotype (mounted on slide). Head yellowish to pale reddish brown; narrow black line on posterior margin; antennae yellowish. Thorax largely rather bright reddish brown; median area of pronotum more yellowish, lateral areas with paler spot and oblique black lines; very narrow paler median line on mesonotum; narrow dark pencilings on pleura. Thoracic sternum yellowish in center, bordered by dark reddish brown. No fore legs remaining on specimen, no middle legs, one hind leg, which is light reddish brown. See note under Paratypes. Wings as in Fig. 1. Wing membrane distinctly tinged with fawn-color, especially in basal half, deepest along costal strip. Veins and cross veins light reddish brown, cross veins quite distinct; 73–82 behind R_1. Hind wing as in Fig. 3. Ground color of abdomen yellowish, banded with light reddish brown; dark brown spot on each side of tergite 1; anterior margins pale, a *very narrow* dusky line on posterior margins of middle tergites, also on 7 and 8. On basal and middle tergites, pale submedian lines which diverge to rearward. A narrow white line appears to mark pleural fold; just below this line, on sternites 2–6, rather prominent brown patches, largest on 2, becoming progressively smaller toward 6. Light brown bands on sternites 1–6 paler midventrally than laterally, giving effect of a pale median strip; ganglionic area of sternite 7 quite deep orange in color. Very little difference in color between dorsal and ventral surfaces. Tails very pale yellow, not darker at joinings. Genitalia yellowish; both forceps and penes relatively long and slender (see Fig. 5).

Many paratypes are very similar to holotype. In others, the pronotum is noticeably paler than remainder of thorax, which part in turn is duller red-brown than in holotype. Last three abdominal segments, sometimes also the apical half of 7, are dark red-brown and plainly opaque. Although no specimen had a fore leg attached, one such leg found in the vial is by reason of its similarity to the other legs almost certain to belong. All legs pale reddish brown; femur and knee of this fore leg slightly darker in color.

Holotype: male imago (mounted on slide), Rio Pedregoso, Costa Rica, February 1939 (D. L. Rounds). In private collection of J. R. Traver. *Paratypes:* 24 male imagos; same data.

SUMMARY

Recognition characters of all species of *Leptohyphes* north of the Amazon River, descriptions of which have been published.

L. priapus: Entire body and legs (unmarked) reddish brown, abdomen much paler than thorax; fore claws of male similar, blunt; tails pale yellowish. Wing (♂) 5–5½ mm. Costa Rica.

L. zalope: Head and thorax reddish brown, abdomen grayish; fore leg deep smoky gray, with streaks and apical band; fore claws of male similar, blunt; tails pale slate gray. Wing (♂) 4¼–4½ mm. Mexico.

L. berneri: Entire body pale reddish brown, thorax and abdomen concolorous, both heavily shaded with black; thorax unusually large and deep; fore femur yellowish with streaks and apical spot; fore claws of male similar, blunt; tails yellowish. Wing (♂) 3½–5 mm. Mexico.

L. sabinas: Head and pronotum blackish, remainder of thorax red-brown; abdomen pale yellowish, heavily gray-shaded; fore femur reddish brown, with streaks and apical band; fore claws of male dissimilar; tails dark gray. Wing (♂) 4½–5 mm. Mexico.

L. nigripunctum: Head grayish, pronotum whitish, meso- and metanota bright red-brown; abdomen yellowish white, gray-banded; fore femur yellow, with streaks and apical band; fore claws of male (probably) dissimilar; tails whitish. Wing (♂) 4 mm. Venezuela. Genitalia, *peterseni* type.

L. brevissimus Eaton: Head, thorax and abdomen dark pitch brown; fore femur light pitch brown. Only female known. Wing (♀) 4½–5½ mm. Guatemala.

L. costaricanus Ulmer: Head and pronotum dark brown, black-marbled; remainder of thorax dark chestnut brown; abdomen smoky brown, paler ventrally; fore leg grayish brown; tails whitish; no membranous processes. Only female known. Wing (♀) 4½ mm. Costa Rica. (I believe this species to be a *Tricorythodes;* cross veins few in number, arranged as in *Tricorythodes;* CuP *not* strongly arcuate).

LITERATURE CITED

Eaton, A. E. 1882. Announcement of new genera of the Ephemeridae. Ent. Mo. Mag. 18: 208.

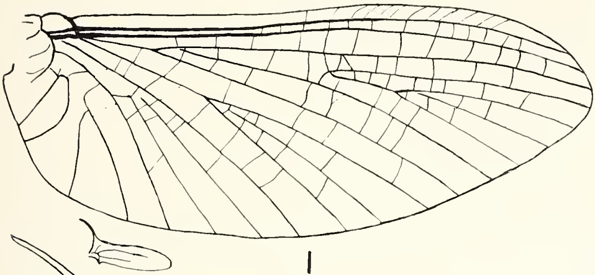
——— 1892. Ephemeridae. *In* Biologia Centrali-Americana, Neuroptera 38: 12.

Traver, J. R. 1943. New Venezuelan mayflies. Bol. Ent. Venezol. 2: 82.

Ulmer, G. 1919. Neue Ephemeropteren. Arch. f. Naturg. 85: 45.

EXPLANATION OF PLATE

Fig. 1. *Leptohyphes priapus,* wings of male paratype (wings of *sabinas, berneri* and *zalope* very similar). Fig. 2. *L. berneri,* hind wing of male paratype (*sabinas* and *zalope* very similar). Fig. 3. *L. priapus,* hind wing of male paratype. Fig. 4. *L. berneri,* genitalia of male paratype. Fig. 5. *L. priapus,* portion of genitalia of male paratype. Fig. 6. Left fig.—fore tarsus of male *L. berneri* paratype: Center fig.—claws of same, different aspect: Right fig.—*L. priapus,* third tarsus of male paratype.



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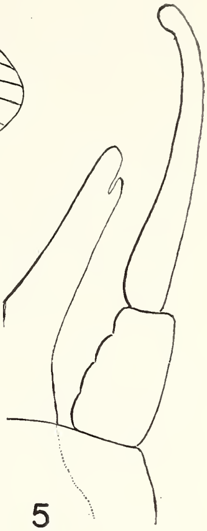

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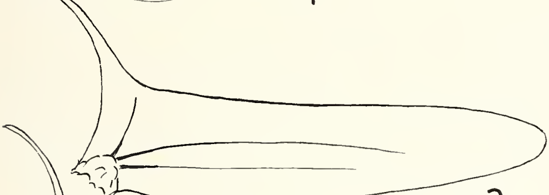

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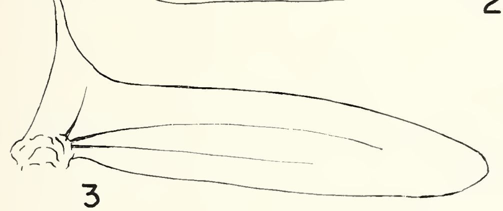

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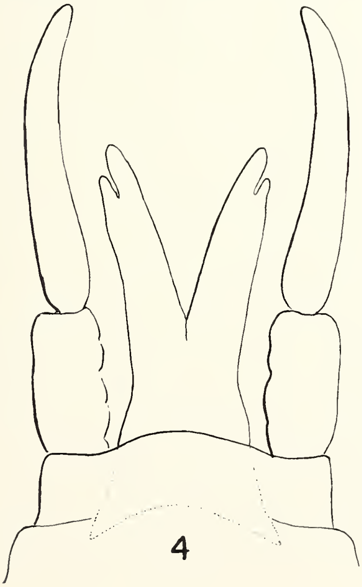

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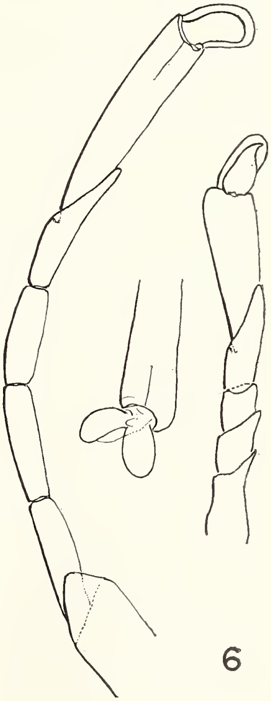

6

A NEW PRIONONYX AND A KEY TO THE NORTH AMERICAN SPECIES (HYMENOPTERA: SPHECIDAE)

By R. M. Bohart, University of California, Davis

The genus *Priononyx* Dahlbom is sometimes treated as a subgenus of *Chlorion* Latreille but it appears to be sufficiently distinctive to warrant generic status. It differs from other Chlorionini in having the second submarginal cell of the forewing higher than broad (as in *Chlorion*) and in addition having three to six teeth on the inner margin of each tarsal claw.

The most useful publications dealing with our species of this genus are those of Fernald (1907) and Willink (1951). The latter is particularly valuable since it contains illustrations of male genitalia and other structural features. Five species have been recorded from America north of Mexico, one of which is the well-known black *P. atrata* (Lepeletier). A less common and undescribed species has been confused with it in collections. The holotype of the new species will be deposited in the California Academy of Sciences. Paratypes will go to the collections of the University of Kansas, University of California, Oregon State College, University of Arizona, Cornell University, U. S. National Museum, American Museum of Natural History, Academy of Natural Sciences at Philadelphia, and Museum of Comparative Zoology at Harvard, as well as the personal collection of R. R. Dreisbach.

Priononyx subatrata, n. sp.

Male.—Black, mandible tip and claws partly reddish brown; wings dark brown and slightly violaceous. Pubescence of head and thorax thick, erect, black, and 2 to 4 times as long as mid-ocellus diameter; that of abdomen short, sparse, appressed, yellowish. Puncturation moderate and close on front of head and most of thorax, obscure toward vertex and on abdomen; punctures of scutum distinct and mostly one or more diameters apart, intervening spaces shiny; postscutellum shiny and distinctly punctured; legs sparsely punctured, finely shagreened, somewhat shiny; propodeum shagreened, indistinctly cross-striate above, more rough laterally. Antennal flagellum with basal 3 segments gradually increasing in length, II about as long as scape, III–V with complete, slender fossulae, VI with slender fossula on basal three-fifths (up to five-sixths on some paratypes); clypeus broadly excavated apically; least interocular distance about three-fourths distance at vertex. Scutellum distinctly two-humped. Sternites entire posteriorly;

aedeagus with an acute notch nearer apex than breadth of aedeagus at notch (farther from apex in *P. atrata*). Body length 16 mm., wing length 13 mm.

Female.—About as in male except as follows: flagellar segments without fossulae, I slender and 1.5 times as long as II, both together equal to interocular distance at posterior ocelli; puncturation and shagreening rather fine, median one-third of scutum shiny with scattered punctures. Fore-tarsal comb black, about as long as terminal tarsal segment. Body length 17–20 mm., wing length 15–17 mm.

Holotype male, Deep Springs, Inyo Co., California, July 17, 1953 (W. D. McClellan). *Paratypes,* 81 males, 26 females, June to September, from the following localities: CALIFORNIA: Deep Springs and 13 miles south of Olancha, Inyo Co. (W. D. McClellan, E. I. Schlinger, P. D. Hurd); Blythe, Mecca and Hopkins Well, Riverside Co. (J. C. Hall, M. Wasbauer, G. D. Marsh, P. D. Hurd); Imperial Co. (J. C. Bridwell); Borrego, San Diego Co. (P. D. Hurd); Gazelle, Siskiyou Co. (A. T. McClay). OREGON: Arlington (M. W. Sanderson). NEVADA: Pyramid Lake (R. H. Goodwin). ARIZONA: 8 miles south of Toltec (T. R. Haig), Florence (C. R. Biederman), 8 miles west of Eloy (T. R. Haig), Grand Canyon South Rim (M. A. Evans), Kaibab Forest (M. Wasbauer), Douglas (W. W. Jones, R. R. Dreisbach), San Simon and Willcox (R. R. Dreisbach). NEW MEXICO: Jemez Springs (J. Woodgate), Highrolls, 25 miles west of Tularosa (E. E. Kenaga), White Sands (R. H. Beamer), Las Cruces, Mesilla Park (C. N. Ainslee), Alamogordo, Luna Co. and Bernalillo Co. (R. R. Dreisbach), Friona and Rodeo (R. R. Dreisbach). UTAH: Salt Lake City (R. C. Shannon), Delta (G. F. Knowlton), Saltair (G. S. Lake). TEXAS: Valentine (L. A. Stephenson), Davis Mountains (L. D. Beamer), Cornudas (H. E. Evans), El Paso (J. C. Bradley), Marfa (Mitchell and Cushman), Brewster Co. (Mitchell and Cushman), Pecos, Big Bend National Park (B. J. Adelson). MEXICO: Chihuahua, Chih. (H. E. Evans); 13 miles south of Juarez (E. E. Gilbert, C. D. MacNeill).

The new species is obviously related to *atrata* but the male of *subatrata* has the fossula of flagellar segment VI slender and incomplete distally, and the aedeagus is notched nearer the apex. Both sexes have the scutum and raised scutellum somewhat polished and distinctly punctured. The female lacks the pale appressed facial pubescence of *atrata*.

These differences are incorporated in the following key. It should be noted that the females of *pubidorsum* Costa and *thomae* (Fabricius) are very similar in appearance and have not been distinguished previously. The slightly different structure of the clypeus seems to be a separating character for material at hand.

Key to the Genus Priononyx in America North of Mexico

1. Antenna 13-segmented, some of the flagellar segments with conspicuous flattened areas (fossulae); abdomen without sting (males) 2
Antenna 12-segmented, no flagellar segments with fossulae; abdomen with a sting ordinarily visible (females) 7
2. Abdomen black or brownish-black 3
Abdomen variously marked with reddish 4
3. Flagellar segment VI with broad fossula extending entire length of segment; scutum dull, individual punctures obscured by shagreening; scutellum slightly raised but dull .... *atrata* (Lep.)
Flagellar segment VI with narow fossula not reaching distal end of segment; scutum partly polished, many individual punctures distinct; scutellum strongly raised, summit shiny .... *subatrata* Bohart
4. First flagellar segment much longer than third; scutum shiny in part and with numerous distinct punctures; free clypeal edge convex medially .... *ferruginea* (Fox)
First flagellar segment shorter than third; scutum completely shagreened or striate; free clypeal edge concave medially 5
5. Sternite VI with a broadly U-shaped median emargination .... *pubidorsum* (Costa)
Sternite VI entire medially 6
6. Scutellum low; wings lightly brown-stained .. *thomae* (Fab.)
Scutellum gibbous; wings dark brown, violaceous .... *striata* Smith
7. Wings lightly brown-stained, at most; abdomen usually bright red 8
Wings dark brown, violaceous; abdomen black or dark red 10
8. Clypeal free edge entire medially; leg bristles pale; wings water-clear .... *ferruginea* (Fox)
Clypeal free edge notched medially; leg bristles black; wings somewhat stained. 9
9. Smooth dimpled area preceding clypeal notch much larger than median ocellus .... *pubidorsum* (Costa)

Smooth dimpled area preceding clypeal notch smaller than median ocellus .... *thomae* (Fab.)

10. Clypeal bristles partly pale; scutum covered with strong longitudinal striae .... *striata* Smith

Clypeal bristles black; scutum not strongly striate 11

11. Clypeus with silvery to golden appressed pubescence; scutum completely shagreened, dull; scutellum not especially raised nor shiny .... *atrata* (Lep.)

Clypeus with black appressed pubescence; scutum somewhat smooth and distinctly punctured toward middle; scutellum gibbous, shiny .... *subatrata* Bohart

LITERATURE CITED

Fernald, H. T. 1907. The digger wasps of North America and the West Indies belonging to the subfamily Chlorioninae. Proc. U. S. Nat. Mus. 31: 291–423.

Willink, A. 1951. Las especies Argentinas y Chilenas de "Chlorionini." Acta Zool. Lilloana 11: 53–225.

Dolichopodidae Fly Notes: On July 26, 1957, I found flies of this family to be extremely abundant among the grasses and sedges bordering a small stream in Allen Canyon, Rich County, Utah. A pill box of specimens was sent to F. C. Harmston, who identifies them as follows: 38 *Hydrophorus magdalenae* Whlr. (which was presented by the thousands), 17 *H. sodalis* Whlr., 4 *Hercostomus unicolor* Lw., 3 *Sympycnus cuprinus* Whlr., 1 *Dolichopus adaequatus* Van. D., and 1 *Raphium effilatum* Whlr.

A small catch taken near Woodruff, also in Rich County, August 23, 1957, proved to be 3 *Scelus monstrosus* (O.S.), 1 *Dolichopus plumipes* (Scop.), and 1 *D. amnicola* M. and M., Mr. Harmston reported.—GEORGE F. KNOWLTON, Logan, Utah.

A NEW GENUS AND TWO NEW SPECIES OF ASILIDAE (DIPTERA)

By Frank M. Hull, University of Mississippi

Strophipogon, n. gen.

Type of genus: *Strophipogon bromleyi,* new species.

Flies of medium size, characterized by the quite narrow face and the remarkable antenna, in which the third antennal segment is exceptionally slender and long and has a very short style. Tibial bristles reduced and posterior branch of third vein strongly wavy or undulate. Length 15 mm.

Head: The head is comparatively short and convex anteriorly, the medial area flattened. Face extended beyond the eye only on the lower third and only to a moderate extent. Occiput poorly developed, with scattered, coarse hairs below and slender, bristly hairs in the middle, and 2 or 3 quite weak, proclinate bristles above. Palpus minute, slender, cylindrical. Antenna slender, first segment not quite twice as long as the second segment; the third segment at base is slightly more narrow than the second segment, gradually reduced in width from near the base, is of nearly uniform width over most of its length, but at the outer fourth becomes narrow and only about twice as wide as the very short style; this segment, style included, is at least 3 times the combined length of the 2 basal segments. Face below the antenna about one-twentieth of head width, strongly widened below; pile absent; mystax composed of a lateral, vertical row of 4 long, slender bristles and 2 or 3 long hairs, besides the epistoma.

Thorax: The thorax is high and rather short. Mesonotum with a patch of 10 or 12 fine, acrostical hairs and dorsocentral elements well developed in the middle. Lateral bristles consist of 2 notopleural, 4 supraalar, 2 postalar and 1 long, conspicuous pair on the scutellum; scutellum thick with impressed rim. Lateral metanotal callosity with bristly pile. Prosternum fused laterally.

Legs: The anterior and middle femora swollen slightly at base and middle; hind femur stout, especially beyond the middle, the lower surface plane. The femora bear fine, subappressed setae and conspicuous bristles. Hind femur has 5 dorsolateral, 1 dorsomedial apical, 4 ventral, 2 or 3 ventromedial. Hind tibia slender with a conspicuous, stout, basal, dorsolateral bristle, another beyond the middle, and 1 ventrolateral on the apical fourth, and 1 or 2 weak dorsomedial bristles. Middle femur with 4 stout, anterior, 9 conspicuous, stout, anteroventral bristles and 3 or 4 stout, ventral bristles on the basal half. Anterior femur with conspicuous bristles only on the ventral surface, 5 or 6 on the basal half. Claws stout, sharp; pulvillus long.

Wings: The wings are brownish hyaline with dense villi except on basal cells; posterior branch of third vein with a strong bend or undulation.

Abdomen: The abdomen is comparatively short, subcylindrical, not as wide as mesonotum. Sides of first tergite with 4 stout bristles and other long, bristly hairs. First segment short, second long, others progressively reduced; eighth almost linear. Subapical margins of tergites with long fringes of long, pale, quite slender bristles or bristly hairs. Male terminalia conspicuous, elongate, the superior forceps not strongly divergent; the forceps have a long, hooklike prong posteriorly, another dorsally and both cross the midline.

Strophipogon bromleyi, n. sp.

Length 15 mm. including the antenna, which is 2 mm.

Male. *Head:* The head is black on the front, vertex, postvertex and the whole occiput is also black. The face ground color is very pale, clay yellow, the cheeks likewise, except for a diffuse, blackish spot against the eye. The front, ocellarium, vertex and postvertex are covered with reddish sepia pollen. The occiput is covered with a dense, appressed, quite fine micropubescence, which is pale yellow. The face with more coarse and somewhat flattened pubescence of the same color. Occipital pile and bristles light brownish yellow, the dorsal elements weak and proclinate. The mystax consists of a triangular patch of 8 moderately stout, long, pale yellow bristles in a curved row, together with 2 close-set pairs of similar bristles, one above the other in the midline. All of these bristles are directed and curved downward, extending beyond the apex of the proboscis. In addition, lying outside this triangular area there are 2 long, light brown, bristly hairs, divergent and directed outward on each side. Upper face without pile. Sides of epistoma with 1 or 2 weak, long bristles and several short, fine, bristly hairs. Proboscis slender, brown at the immediate base. Palpus small, quite slender and cylindrical with yellowish bristly hairs dorsally and at apex. Antenna slender and elongate. First segment not quite twice as long as the second, both of these segments yellowish brown. Third segment extremely long and slender, even at the base and gradually attenuate until the apex is a little more than half as wide. This segment is nearly black, bears a short, style-like microsegment with bristly tip. The whole segment is at least two and a half times the combined length of the first two. All antennal pile is bristly setate and dark brown. Ocellarium with only a pair of minute, black bristles behind the ocelli.

Thorax: The whole pleuron is pale orange brown, the whole mesonotum light reddish brown, the latter is opaque, not pollinose, except thinly along the lateral margins, over the whole humerus, postcallus, the whole disc of the scutellum and in a posterior light narrowly on the prescutellar area. The medial margin of the humerus is similarly bordered with reddish pollen, which from an anterolateral angle only is visible as a wide, anterior spot extending backward as a narrow stripe along the dorsocentral area. There is a double row anteriorly of 14 fine, acrostical hairs continued back to near the scutellum. Of the dorsocentral elements there is 1 long, 1 medium and several fine, short elements in front of the suture, and behind the suture 3 moderately stout, long bristles, the equal of the last presutural bristle. Lateral bristles stout but long and finely attenuate. There are 2 notopleural, 2 supraalar, 2 postsupraalar, 2 on the postcallus, the posterior element largest and longest and 1 pair on the scutellar margin, also long and stout. Scutellar margin also with 14 quite short, fine, stiff hairs, a few others on the disc. Margin of scutellum strongly creased. Pleuron everywhere golden pollinose with only a few scattered hairs. Metapleuron with 6 moderately stout, yellowish bristles and considerable similar, but shorter bristly hairs. Hypopleuron with a single long, moderately stout bristle. Lateral metanotal callosity with a tuft of bristly pile curved forward.

Legs: The legs are pale yellowish brown and shining, the apices of all of the femora very narrowly blackish. The tarsal segments are a little darker, especially the end segments. Pile and bristles of the leg chiefly reddish yellow but the dorsal surface and anterodorsal surface and the lateral surface of the hind femur all dense, very fine, dark brown, appressed setate. Hind femur with a stout, reddish ventral bristle near the base, 2 short, dark brown bristles which are also ventral. In the middle a red, medial bristle and dorsolaterally 5 moderately long, sharp, stout, attenuate, reddish bristles, the 1 at the subapex matched by a dorsomedial element. Hind tibia long and quite slender, only slightly widened towards the apex. It bears a conspicuous, basal, dorsolateral, spike-like, reddish, attenuate, stout bristle. Of other stout bristles it has 1 dorsolateral beyond the middle, 1 ventrolaterally beyond the outer fourth. There is a weaker, long, medial bristle at the middle. Bristles of the middle femora accentuated somewhat as in *Hoplopheromerus* Becker. It has an anteroventral row of 8 quite stout, subtuberculate bristles, sharp and attenuate. Behind this row on the basal third are 2 others, 1 of them exceptionally long and anterolaterally there is a cluster of 3 more equally stout bristles, besides another lateral similar bristle at the middle and 1 on the outer third. Posteriorly there are 2 stout bristles, 1 near apex, 1 near the middle. On these tibiae, apart from the apex, there are 2 comparatively short, but quite stout, tuberculate, ventral bristles on the basal half and the anterior tibia with 3 remarkably long, moderately stout, basally attenuate, posteroventral bristles together with a ventral fringe of medium long, bristly hairs. Claws moderately thick, strongly bent at apex, black with red base, the points sharp.

Wings: The wings are uniformly pale brownish hyaline, everywhere with dense villi except in most of the basal cells, most of discal cells, base of fourth and fifth posterior cells and the posterobasal half of the anal cell and the alula which lack villi. Posterior branch of third vein quite wavy or sinuous in the middle.

Abdomen: The abdomen is comparatively short, subcylindrical in the middle, fully cylindrical distally and somewhat flattened basally. Beyond the moderately long, second segment the segments tend to be a little shortened progressively. Eighth segment quite short but of uniform, continuous length. All of the posterior margins moderately long and quite pale, brownish yellow in color. The first 2 segments are light, dully shining, coffee brown, the remaining segments brownish black, and the first 4 have comparatively dense, cinnamon brown pollen. The remaining segments more faintly pollinose. Corners of first segment with 3 stout, long, brownish yellow bristles and numerous, moderately long, similar, bristly hairs. Postmargins of all of the tergites with a fringe of long, slender bristles or bristly hairs, more conspicuous laterally. Sternites entirely pale, brownish yellow with similar pollen not obscuring the shining color. Their postmargins with long, yellow, bristly hairs, the surface with long hairs on the second and third sternites and fine, appressed, short hairs on the remainder. Terminalia shining black, the penis guides red.

Holotype male, Pahang, Federated Malay States, Cameron's Islands, 4800 ft., June 24, 1935. Collected by H. M. Pendlebury. In the collections of the United States National Museum.

Helolaphyctis chrysorheus, n. sp.

This species is characterized by the presence of the dense, appressed, golden pile over the whole mesonotum, scutellar disc and first 5 tergites of the abdomen. Also the marginal bristles of the scutellum are golden. Length 11 mm.

Male. *Head:* The head is black, the gibbosity of the face is prominent, and occupies the lower three-fifths of the face, rather densely covered with long, slender, bristly, black hairs. Lower corner of the face adjacent to the eye with a few golden hairs. Palpus black, the end segment with slender, black bristles, the basal segment with fine, yellow hairs below. The proboscis is short, obtuse, polished black, the base below only a little swollen, the subapex with a dorsal crease. Pile of occiput below is fine, white and abundant. Upper half of occiput with a broad band of numerous, long, slender, black bristles, none of them stout. Medial surface of the eye on the vertex with numerous, yellow hairs. Ocellarium with 2 or 3 pairs of long, slender, black, bristly hairs and 1 or 2 yellow hairs. Eye margins on the front with 1 irregular row of quite long, slender, black bristles and hairs. The front is thinly yellow pollinose and it has a medial groove down the middle. Surface of face with moderately abundant, coarse, appressed, golden pubescence which is much more dense along the lateral eye margins. Antenna black with long, bristly, black pile and at least 3 long, slender, black bristles on the first segment.

Thorax: The pleuron has a bare, middle stripe on the sternopleuron and into the lower portion of the mesopleuron. The posterior mesopleuron and upper sternopleuron have yellow pile. The dorsal border of the mesopleuron have numerous, stiff, black, bristly hairs. Metapleuron with a vertical band of golden pile, each element long with a crinkled end. Mesonotum moderately shining, densely covered with flat, appressed, coarse, golden setae, which changes to longer pile along the anterior margin and contains intermixed, differentiated only posteriorly, long, suberect, golden, bristly hairs. Humerus with long, black, bristly pile in front, shorter, brassy hairs behind. Propleural pile black. Lateral bristles quite weak, there are 1 or 2 notopleural bristles, several long, slender elements above the wing, 3 on the postcallus and 5 pairs on the scutellar margin, which are quite long and reddish golden. Disc of scutellum with dense, matted, golden hairs.

Legs: The legs are black, shining. The femora are stout, especially the hind femur, the latter is concave ventrally and strongly convex above. Dorsally the femora bear long, slender, blackish, bristly hairs with similar elements laterally or posteriorly, many of which change to yellow. Ventromedial surface of the hind femur and hind tibia with dense, erect, pale brown pile. Ventral surfaces of the other legs with fewer hairs. The bristles of the legs are prominent. The hind femur has a dorsolateral row of 6 to 8 long, basally stout, finely attenuate bristles, the same number of shorter, lateral bristles and 1 or 2 distal, long, ventrolateral bristles. Middle and anterior tibia, besides the numerous, dorsal, black bristles, each have several rows of quite long, golden, attenuate, posterior bristles. Claws black, brown on the extreme base, the pulvilli broad, conspicuous, golden brown with golden pile along the edges. The red brown empodium is quite stout basally, the claws covered with minute, reddish micropubescence. All tarsal segments are short, especially the intermediate segments. Hind basitarsi quite robust.

Wings: The wings are pale brownish hyaline, the marginal cell is widely open but the second vein is recurrent at apex, ending at right angle. Anterior branch of third vein is sigmoid, the villi of the wing are dark, reddish brown, slightly more conspicuous apically; the veins are of the same color, the first posterior cell is at most slightly narrowed, fourth posterior cell and anal cell closed with a short stalk. Ambient vein complete.

Abdomen: The abdomen is robust, slightly tapered, so that the end of the abdomen is wide, stout and subcylindrical. The ground color varies from shining black to occasionally dark, reddish brown. The pile is dense, coarse, quite flat appressed and bright golden. However, on the lateral margin of the fifth tergite and almost the whole of the sixth tergite the pile consists of scattered, moderately abundant, fine, suberect, black setae. There is a triangular patch of golden pile in the middle of the base of the sixth tergite; seventh tergite visible only laterally on the right side. Terminalia large, chiefly shining black, bowl-like and with abundant, fine, black pile, becoming yellow on the lamellae.

Female. The female is similar to the male; the abdominal pile is still golden on the first 4 tergites and much of the next two. Also there is a small patch of black pile medially and posteriorly on the fourth tergite. Pile of last 2 tergites fine, appressed, black, setate, becoming widely brassy toward the base of the segment. The posterior margins of the tergites have linear, golden, pollinose bands.

Holotype male, Nova Teutonia, December 9, 1952, collected by Fritz Plaumann; *allotype* female and 3 *paratype* male, and 4 *paratype* females, all with the same data. This material was collected by Fritz Plaumann for the author and is in the author's collection. Also there are 4 *paratype* males and 1 *paratype* female collected by Mr. Plaumann, but in 1936, otherwise with the same data. This last group of paratypes is in the collections of the British Museum (Natural History).

A NEW NEOTROPICAL HALOBATID (HEMIPTERA: GERRIDAE)

By Carl J. Drake, Smithsonian Institution, Washington, D.C.

The present paper characterizes a new species of *Metrobates* from Brasil and the macropterous male and female of *Rheumatobates spinosus* Hungerford from Bolivia. The types are in the Drake Collection (U.S.N.M.).

Metrobates vigilis, n. sp. (Fig. 3)

Apterous form: Blackish with the large U-shaped mark on base of head reddish brown and the discal spot of pronotum golden yellowish. Entire body beneath, abdomen above, genital segments, pronotum, hind acetabula above, meso- and metapleura, and stripes on mesonotum (one on each side of impressed median line and one on the upper part of each lateral side) bluish pruinose. Length 4.00 mm.; width male 2.00 mm. and female 2.40 mm.

Male: Antennae blackish with a very wide, subbasal, yellowish orange band, very shortly pubescent, with a few long hairs (inferior side) beyond the pale band of segment I, segments II and III with usual apical protuberances—measurements: I, 120; II, 40; III, 25; IV, 30. All acetabula beneath unarmed. Fore femora with a long, spine-like projection beneath near basal third as in *M. laetus;* tibiae with the usual apical protuberances. Hind femora without long hairs. Venter with seventh segment about twice as long as preceding segment, broadly shallowly concavely excavated behind. Body rather thick, widest across base of mesonotum, with lateral sides slowly convexly narrowed anteriorly. Macropterous form unknown.

Female: Broader than male, but with color and markings practically same.

Holotype male, *allotype* female and two *paratypes* (male and female), Nova Teutonia, St. Catrina, Brasil, Oct. 7, 1957 (Fritz Plaumann).

This is the fourth species of the genus *Metrobates* to be described in which the males possess a long spine on the ventral face of the anterior femora. *M. vigilis* (Fig. 3) is closely related to *M. laetus* Drake (1954) (Fig. 4) and can be separated from it at once by the lack of spines on the underside of hind acetabula and the broader parameres as shown in the illustrations (Fig. 4). The body of *M. laetus* is more compressed dorso-ventrally and broader in front.

There is also a prominent spine on inferior face of each hind acetabulum.

Rheumatobates spinosus Hungerford (Figs. 1 & 2).

Rheumatobates spinosus Hungerford, 1954. Sci. Bull. Kan. Univ. 36(1): 536, 562, 2 figs. (Orig. desc.; type locality Brasil).

This species was described from a mutilated male, taken in Rio Parú, Castanha Region, Brasil. Hind leg of male (Fig. 2); trochanter strongly modified, very long, armed subbasally on inner face with an extremely long spine (as long or longer than trochanter itself), the apical fourth of which is gently curved downward; femur (Fig. 2) slightly bent, tapering distally, with many long hairs within on basal half, the hairs gradually becoming slightly shorter apically. Basal antennal segment and a narrow ring on basal third, all coxae and trochanters, posterior part of all acetabula, anterior femora, first genital segment of male beneath, posterior part of seventh venter flavotestaceous.

Macropterous form: Color and markings of appendages and body as in apterous form. Pronotum with median quadrate spot reddish testaceous. Mesonotum dark velvety fuscous-black, beset with tiny, scale-like, golden pubescence. Hemelytra, both sexes, much

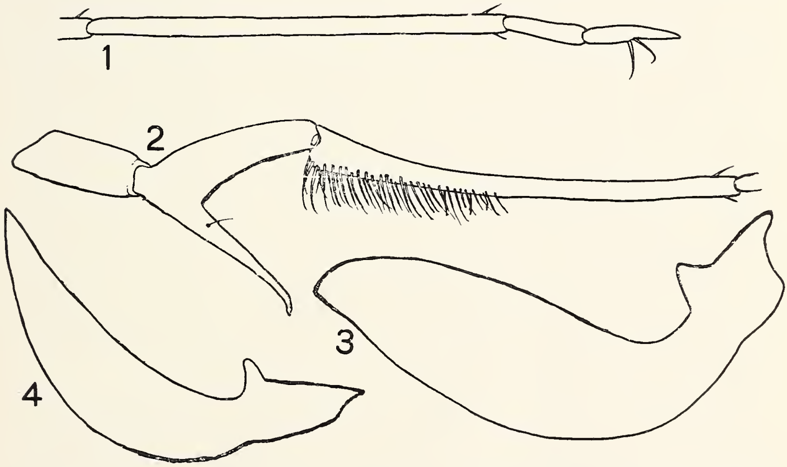

Fig. 1. *Rheumatobates spinosus,* male hind tibia and tarsus. Fig. 2. *R. spinosus,* male hind coxa, trochanter and femur. Fig. 3. *Metrobates vigilis,* right male paramere, lateral aspect. Fig. 4. *M. laetus,* right male paramere, lateral aspect.

longer than abdomen, 2.25 mm. long, pale brownish fuscous with veins dark fuscous and the breaking sutures pale and prominent. Wings opaque, clouded with fumose, about three-fourths as long as hemelytra. Length 3.25 mm., width (across humeri) 0.80 mm.

Allotype (macropterous female), Santa Cruz, Bolivia, Oct. 22, 1957, Drake Collection (U.S.N.M.). One other female and 2 males, all macropterous, also taken with allotype. Known heretofore only from Brasil.

THE OCCURRENCE OF MEGALONOTUS CHIRAGRA (F.) IN THE EASTERN UNITED STATES WITH NOTES ON ITS BIOLOGY AND ECOLOGY (HEMIPTERA: LYGAEIDAE)

By James A. Slater and Merrill H. Sweet[1], Storrs, Connecticut

On June 26, 1957, the senior author collected a single female specimen of the Palearctic species *Megalonotus chiragra* at Mansfield Center, Connecticut under a thick dry layer of weed stems and assorted debris, chiefly "wash" from the heavy floods of 1955. Subsequently, the junior author collected the species in large numbers at two separate localities within the state. The first of these collections was made on August 21, 1957, at Noank, Conn., which lies along the north coast of Long Island Sound in eastern Connecticut at the mouth of the Mystic River. On September 1, 1957, the second collection was made at E. Canaan, Connecticut in the extreme north-west corner of the state, an area that is essentially a southward extension of the Berkshire Hills and includes the highest altitudes within the state. These three locality records constitute the first and only records (other than quarantine interceptions) of the species in Eastern North America. The habitats and biological notes that follow the discussion of the occurrence of *Megalonotus* are taken from the last two localities.

In 1923 Van Duzee described *Rhyparochromus chiragra var. californicus* from specimens taken in California. Van Duzee's description is very meagre and discusses *var. californicus* as having some characteristics of *chiragra* and some of another Palearctic form, *sabulicola* Thoms. This latter is now considered, at most, a color variety of *M. chiragra*.

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[1] Dept. of Zoology and Entomology, U. of Connecticut.

We have examined specimens from the western United States and a number of European countries and conclude that there is no essential difference between specimens from the east and west coasts of North America and Europe. Therefore, *var. californicus* V. D. is here considered as a straight synonym.

The question of the method of introduction of *M. chiragra* into North America immediately arises. Lindroth (1957, p. 189), in developing his ballast conclusions, includes *M. chiragra* as one of the Hemiptera collected at ballast sites in England. It may be noted that one-third of the Heteroptera listed by Lindroth (9 of 26 species) are Lygaeidae and that all nine of these are ground-living forms belonging to the subfamily Megalonotinae (= Rhyparochrominae). It thus appears that *M. chiragra* is a species that might well be introduced by ballast. Indeed the "Geographical criterion" (Lindroth, p. 138) fits this species very well. The recently discovered seed feeding habits of many of the ground-living Lygaeidae (Ashlock, 1958) indicates that an available food source would be present in a ballast situation.

It is therefore quite conceivable that the species did reach western North America in just this way. However, there are rather strong objections to the ballast theory as the most likely explanation for the introduction of *M. chiragra* into the eastern United States. Foremost of these is the recent date of appearance. It seems likely that if *M. chiragra* had been present in New England in any numbers thirty-eight years ago it would have been taken by such an assiduous collector of the area as H. M. Parshley. In the United States National Museum are four specimens taken at quarantine stations as follows: "Mat about roses, Inspector House, Wash. D.C., 1932, from Czechoslovakia (2)", "in moss packing of grape vines, Philadelphia, Pa., 1934, from Czechoslovakia (1)", "on strawberry, New York, N.Y., from France (1)." These records seem to be strong evidence of the probable method by which *M. chiragra* was introduced into the Northeast. It seems most likely that *M. chiragra* has been introduced subsequent to the ballast period, on plant material passing through northern ports.

Both E. Canaan and Mansfield Center, Conn., are in northern highland areas and not adjacent to commercial centers where plant material is imported. This suggests that the species has probably been present in the Northeast for some time and will be found beyond the limits of such a small geographical unit as Connecticut.

The ballast theory should not, of course, be completely ruled out. Collecting of ground-living Hemiptera has been limited in New

England, and no substantial collections have been made in the critical areas of Newfoundland and Nova Scotia where much early ballast was dumped. It should be noted in passing that Noank, Conn., is adjacent to the important old sailing port of Mystic where ballast may have been dumped. While we consider ballast transport as a method of introduction less likely than accidental transmission on imported plants, the possibility should not be overlooked, and future collecting may alter present conclusions considerably.

Pfaler (1936) who studied *M. chiragra* in Finland notes that other European authors (Reuter, 1875; Jensen-Haarup, 1912) have found *Megalonotus* overwintering in the adult stage. Butler (1923) notes that in England the nymphs appear in June and July, that the final molt occurs in August and that the adults are present in all months from March to October. Pfaler's (ibid) own work on life cycles substantiates these findings.

Butler (ibid) found *Megalonotus chiragra* under dead leaves and moss and at the roots of grasses and among vegetable rubbish generally, especially in sandy places and in the short moss on hillsides. Butler quotes Morley as finding *Megalonotus* in the burrows of water voles and among river refuse, Tuck as taking it from refuse in a nest of *Bombus muscorum,* and Saunders as collecting adults in spring under heaps of coarse grass that had laid rotting since being cut the past winter. According to Krogerus (1932) *M. chiragra* is often collected in shifting sand areas in Finland. Pfaler (1936) states that of the two species of the genus found in Finland (*M. chiragra* and *M. antennatus*), *antennatus* has a slower development. Pfaler correlates this with the habitat preferences of the two, as *M. chiragra* lives in open sites where the earth is warmer than in the woodlands, and development accordingly hastened. In general this European habitat type correlates with the habitats of the stations where the insect was collected in Connecticut.

The habitat at Noank was a weed-overgrown playground located within the village limits. Despite intensive collecting in the Noank area, this was the only station found. The field was dry and the plants formed only a sparse cover. *Megalonotus* was confined to a corner of the field which was noticeably richer in composites such as *Solidago sp., Achillea millefolium* (L.), *Ambrosia, sp.* and *Taraxacum officinale* Weber. The major grass was *Agropyron repens.* The insects were found on the ground, beneath dry litter, especially where the substrate was free of plants and somewhat gravelly and sandy. They were not present within or upon the vegetation itself. A rough count (August 21) showed 5% third instar, 10% fourth, 25% fifth, 60% adult, with a variable density of about 25–30 per sq. meter over a sampled area of about 7 sq. meters. The last date for nymphs was September 6. By September 10, only adults were present and the population density had declined to 15 per sq. meter.

At Canaan, the habitat was a narrow sandy flood plain of the Blackberry River which frequently overflows two or three times a year. About a quarter of the 300 × 75 meter area was covered with a dense stand of Batchelor's Buttons (*Centaurea cyanus* L.) within which *Megalonotus* was present in a heavy concentration of 60–75 per square meter, in four random meter counts. About 15% of the population consisted of nymphs of the fifth instar. By September 23, only a few nymphs were left. In early October the population was in much the same abundance, but a few weeks later, by October 31, none were found. Whether the insects had gone into hibernation as a colony, or had disappeared by a late dispersal is not known.

Megalonotus from both localities survived in the laboratory for four months upon the seeds of Batchelor's Button, (*Centaurea cyanus* L.) which were scattered over the ground at the Canaan site, and also upon sunflower seeds in a separate test. At Canaan, *M. chiragra* was always found closely restricted to the vicinity of the food plant but was always upon the ground, never upon the vegetation proper. It seems certain that *Megalonotus,* like many other ground living Lygaeidae of its subfamily, is essentially a seed feeder.

Unfortunately, no mating was observed in the laboratory and no eggs were laid. Nymphs of the third, fourth, and fifth instars, however, were collected in the field and are described here. Butler (1923) described an "intermediate" instar and Halbert (1935) described a fifth instar from Ireland.

Description of the Nymphs

Third Instar (in alcohol). General coloration much as in succeeding instars, sclerites lighter, abdomen much redder; posterior portion of metanotum translucent white, confluent with a mesal colorless area on first abdominal tergite; antennae, labium and legs fuscescent, second antennal segment lighter, hairs shorter and finer than in succeeding instars, tibial spines weak and colorless. *Head* more elongate than in succeeding instars, length (including the usually recessed posterior portion) .55 mm., width across eyes .54

mm., interocular space .38 mm. *Pronotum* much as in next instar, length .53 mm., width .78 mm. Length of labial segments: I .26 mm., II .26 mm., III .23 mm., IV .38 mm.; spine on femur relatively smaller. *Total length* 1.45 mm.

Fourth Instar (in alcohol). Coloration and general appearance much as in fifth instar, posterior portion of pronotum darker than remainder, metanotum entirely dark; mesal region of 1st abdominal tergite translucent white, abdomen dark red, intermediate in hue between third and fifth instars, spots on connexivum as in fifth instar; body somewhat less pilose than fifth. Length of head .70 mm., width across eyes .67 mm., interocular space .53 mm. *Pronotum* like fifth instar but less convex, length .55 mm., width .93 mm. Length of labial segments: I .37 mm., II .40 mm., III .33 mm., IV .58 mm. *Total length* 2.65 mm.

Fifth Instar (in alcohol). Head and thoracic notum piceous, paling to fuscous ventrally; eyes red; median white spot on metanotum of preceding instars absent; bright translucent red spots (trichobothria) present along the ventral connexivum of abdominal segments three, four and five and two somewhat fainter spots upon segments five and six; mesal black areas present around scent gland openings, posterior one largest; mesal black patches present on dorsum of the seventh and eighth, and venter of sixth, seventh and eighth segments, that on sixth sternite largest; labium, tibiae, and second tarsal segment fuscescent, femora fuscous, spines dark, basal two-thirds of first and entire third and fourth antennal segments dark brown, apical fourth tending to be pale; second antennal segment and distal portion of first testaceous; first tarsal segment pale translucent; entire body sparsely pilose with semierect yellow hairs becoming finer ventrad.

Head with short but distinct epicranial stem (usually hidden, as head is somewhat recessed into thorax); eyes reniform, in contact with anterolateral margin of pronotum; length of head .82 mm., width across eyes .73 mm., interocular space .58 mm. *Pronotum* subquadrate, convex, anterior and posterior margins shallowly concave, posterior lobe indistinctly demarcated, lateral margins slightly convex, narrowly explanate. Length of pronotum .78 mm., width 1.24 mm.; mesothoracic wingpads broad, rounded, barely attaining fourth abdominal tergite. Maximum width of abdomen 1.55 mm., scent gland openings present between tergites 3–4, 4–5, and 5–6; abdominal tergites 2–6 subequal in width. *Labium* reaching caudad to metasternum, second segment just exceeding base of head. Length of labial segments: I .22 mm., II

.45 mm., III .44 mm., IV .58 mm. Fore femora incrassate with a large basal spine present upon ventral surface, fore tibia distally enlarged. *Total length* 3.51 mm.

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We wish to extend our sincere appreciation to Dr. Reece Sailer of the United States National Museum for the loan of specimens and records from his institution.

LITERATURE CITED

Ashlock, P. D. 1958. A revision of the genus *Malezonotus* (Hemiptera-Heteroptera: Lygaeidae) Ann. Ent. Soc. Amer. 51: 199–208.

Butler, E. A. 1923. A biology of the British Hemiptera-Heteroptera. H. F. and G. Witherby, London.

Halbert, J. N. 1935. A list of the Irish Hemiptera (Heteroptera: Cicadidae). Proc. Royal Irish Acad. 42: (B) (N.8): 211–318.

Jensen-Haarup, A. C. 1912. Taeger (Danmarks Fauna, 12) Danish Heteroptera, G. E. C. Gad, Kobenhaun.

Krogerus, R. 1932. Uber die Okologie and Verbreitung der Arthropoden der Triebsandgebiete an den Kusten Finnlands. Acta Zool. Fenn. 2: 1–308.

Lindroth, C. H. 1957. The faunal connections between Europe and North America. New York: John Wiley & Sons. (Stockholm: Almquist and Wiksell).

Pfaler, Elvi von. 1936. Lebenzyklen der Lygaeiden (Hemiptera). Not. Ent. 16: 65–85.

Reuter, C. M. 1875. Anteckninger om Heteropter-faunans utvec Klingstider och overvintring i sydvestia Finland. Acta Soc. Faun. Flor. Fen. (14): p. ? (Fide Pfaler-original not seen)

Van Duzee, E. P. 1923. Our first *Rhyparochromus* (Hemiptera: Lygaeidae). Pan Pac. Ent. 5: 47.

Flies in Abundance: On September 11, 1957, I felt "dragged down," having been fighting a cold for a week with only fair success. I decided to go out in the sunshine to nearby Logan Green Canyon to look for aphids, and to check on grasshopper conditions. My third stop was made in a clearing where the warm sun reflected off the blue, shiny car I was driving. Rhagionid, anthomyid, tachinid, therevid, sepsid, sarcophagid, and many other kinds of flies began flying back and forth, over and around the automobile. For one hour I swung my net, "catch as catch can," about the car. I took approximately one pint of Diptera, rarely moving a rod from the automobile. For the collector, this was "living."

I picked out and sent Professor H. J. Reinhard a couple of pill boxes full of Tachinidae and related material, resulting in the following list of species: Tachinidae—*Macromeigenia frioensis* Rnh., *Voria ruralis* Fallen, *Aplomya caesar* Ald., *A. confusionis* Sllrs., *Phorocera facialis* Coq., *P. erecta* Coq., *Zenillia hyphantriae* Tns., *Gaediopsis flavipes* Coq., *Ceromasia aurifrons* Tns., *Phrynolydella polita* Tns., *Acemya tibialis* Coq., *Pseudochaeta* sp., *Achaetoneura* sp., *Tortriciophaga tortricis* Coq., *Paradidyma singularis* Tns., *P. apicalis* Rnh., *P.* nr. *retracta* Rnh., *Phantasiomyia gracilis* Tns., and *Neodichocera tridens* Walt. Other flies identified by Prof. Reinhard included: Sarcophagidae—*Sarcophaga lherminieri* R.D.; Anthomyiidae—*Helina rufitibia* Stein.; Muscidae—*Muscina stabulans* Fallen; and Sepsidae—*Sepsis violacea* M.—George F. Knowlton, Logan, Utah.

PUBLICATIONS RECEIVED

Guide to the Families of Mites, by E. W. Baker, J. H. Camin, F. Cunliffe, T. A. Woolley and C. E. Yunker. ix + 242 pp., numerous figures. 6 × 9 ins., spiral binding. June, 1958. Contribution Number 3 of The Institute of Acarology, University of Maryland, College Park. (Price $5.00).

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The Tingoidea of New England and their Biology, Bailey, 140 pp., 6 figs. 1951.	$ 5.00
The Hippoboscidae or Louse-Flies of Mammals and Birds, Part I. Structure, Physiology and Natural History, Bequaert, 442 pp., 21 figs., 1952–53.	$10.00
Part II. Taxonomy, Evolution and Revision of American Genera and Species. 611 pp., 83 figs. 1954–56.	$15.00

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Vol. LIII DECEMBER, 1958 No. 5

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BULLETIN

OF THE

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Vol. LIII DECEMBER, 1958 No. 5

TWO NEW SPECIES OF WATER-STRIDERS FROM PERU (HEMIPTERA: GERRIDAE)

By Carl J. Drake, Smithsonian Institution, Washington, D. C.

The present paper characterizes two new species of water-striders from Peru, one belonging to the genus *Rheumatobates* and the other to *Cylindrostethus.* The members of the latter genus are the largest water-striders found in the Americas. The types of the new species are in the Drake Collection (U. S. National Museum).

Rheumatobates minimus, n. sp.

Apterous form: Very small, velvety black, with a subapical, rectangular, orange spot on pronotum. Antennae blackish fuscous, with narrow basal part and most of ventral surface of first segment whitish testaceous. Legs blackish fuscous with all acetabula, coxae, trochanters and bases of femora pale testaceous. Length 1.75 mm., width 0.60 mm.

Head with impressed, median, longitudinal line. Labium blackish fuscous, shiny, extending between anterior coxae. Antennae moderately long, straight, unmodified, with one or two stiff, dark hairs on third segment—segmental measurements: I, 19; II, 16; III, 15; IV, 18; (80 units equal 1 mm.). Anterior femora moderately swollen, thickest near middle, unmodified, 0.45 mm. long, beneath with a row of five or six, long, slender, blackish spines; tibiae enlarged apically, thickest at apex, 0.25 mm. long. Middle legs straight, with femora 1.35 mm. long, tibiae 1.15 mm. long. Hind legs straight, unmodified; femora 1.60 mm. long, extending nearly half of its length beyond apex of last genital segment; tibiae 0.50 mm. long.

Pronotum short, nearly truncate at middle behind. Mesonotum long, slightly longer than wide. Male genital segments beneath with a prominent, median, longitudinal furrow extending from near the base of first to middle of second segment.

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Macropterous male: Pronotum convex across humeral angles, rounded on hind margin, median length and width (across humeri) subequal. Hemelytra very long, dark fumous, with apices reaching beyond tips of hind femora, not quite attaining tips of hind femora, with transverse breaking suture a little in front of middle. Length 2.50 mm. (to apex of hemelytra).

Holotype apterous male and 2 male *paratypes* (1 macropterous and other apterous) taken near the shore in quiet waters, River San Alejandro (Pampa Sacramento), Department of Loreto, July, 1958 (F. Woytkowski).

This tiny species has straight, unmodified antennae and legs. It is rather similar in general aspect to *R. drakei* Hungerford, but easily separated from it by measurements of the antennal segments beneath. Hungerford states that the anterior femur of male *drakei* has a row of about ten spines on the ventral side and that the comparative segmental measurements of antennae are: I (45), II (18), III (35) and IV (30).

Cylindrostethus podargus, n. sp.

Apterous male: Very long, parallel-sided, blackish with vertex and a median, longitudinal stripe on anterior half of pronotum flavous; meso- and metanotum with a pair of narrow parallel, chocolate-brown stripes (one on each side) of meso- and metanotum; connexiva also with exterior margin chocolate-brown. Entire dorsal surface blackish, very densely clothed with recumbent, grayish white pubescence, the lateral sides and body beneath with slightly longer and more bluish pubescence. All acetabula, coxae and trochanters flavotestaceous. Anterior legs yellowish brown with ventral surface of femora, tibiae, apices of tibiae and entire tarsi blackish fuscous. Middle and hind legs yellowish brown with tips of femora, tibiae and tarsi blackish fuscous. Apical part of first genital segment above and most of last segment yellowish brownish. Length 18.50 mm., width 2.10 mm.

Antennae moderately long, fairly stout, with terminal segment slightly bent and tapered on apical third; measurements of segments: I, 2.50 mm.; II, 0.80 mm.; III, 0.25 mm.; IV, 1.30 mm. Labium with last segment black, shiny. Pronotum subquadrate, broadly depressed on median, longitudinal line; mesonotum not longitudinally depressed on sides, four times as long as broad, with a median, impressed, longitudinal line; metanotum about as long as pronotum, depressed, with a median, longitudinal, impressed line. Connexiva upright, moderately wide, each terminating behind in a moderately long, straight spine, which extends backward almost to middle of first genital segment. First genital segment rather broad, impressed basally on each side, rounded behind; terminal segment very long, slender, tapering to apex, not quite twice as long as first segment, deeply impressed basally on each side, with a small, rectangular, platelike process on each side. Last segment of abdomen beneath deeply broadly excavated behind, without median notch. Apices of middle and hind femora extending beyond tip of last genital segment.

Apterous female: Slightly longer than male. Color and markings same, except connexiva yellowish brown with outer margins lighter chocolate-brown. Connexiva also upright with apices terminating in sharp, black, outwardly curved spines that reach scarcely beyond middle of first genital segment. Apices of femora of last two pairs of legs extending a little beyond the tip of last genital segment. First genital segment narrower than in male, also rounded behind; terminal genital segment very long, slender, tapering posteriorly to a sharp point. Length 19.30 mm. Macropterous forms unknown.

Holotype male, *allotype* female and 5 *paratypes,* River San Alejandro, (Pampa Sacramento), Department of Loreto, Peru, July 1958, Felix Woytkowski. The specimens were netted in the swift-flowing waters some distance from the shore.

This species belongs to the group of species that have the hind margin of the last ventral tergite in the male very deeply widely roundly excavated and without a median notch. The other members of this group are: *C. palmaris* Drake & Harris, *C. regulus* (B.-White) and *C. hungerfordi* Drake & Harris. The narrow, chocolate-brown stripes (one on each side of the dorsal surface) of meso- and metanotum distinguish *C. podargus* at once from the above species. In general aspect and size, it looks very much like the other group of the genus which has the last ventrite behind doubly emarginate (with a smaller median notch at the middle of the large emargination) and the thorax above without longitudinal stripes.

ETHIOPIAN LYGAEIDAE I: THE GENUS AULACOPELTUS (STAL) (HEMIPTERA: HETEROPTERA)

By James A. Slater[1]
Storrs, Connecticut

The members of this genus are among the largest insects included in the family Lygaeidae. Individuals run to nearly 20 mm. in length, are chiefly black and orange in color and are confined in distribution to the Ethiopian region.

During the course of work underway upon various aspects of the taxonomy of the Lygaeidae of Africa, it has become apparent that certain changes and modifications are necessary in our understanding of the genus *Aulacopeltus.* The present paper discusses generic synonymy, presents a key to the species and describes a new species from Kenya.

Aulacopeltus (Stal)

Aulacopeltus Stal, 1868. Hemip. Fabr. 1: 75.
Aulacopeltus Stal, 1874. Enum. Hemip. 4: 98 & 100.
Rhodesia Distant, 1911. Ann. So. Afr. Mus. 10: 41.
Cryptocara Bergroth, 1916. Wien. Ent. Zeit. 35: 221.
Aulacopeltus Villiers, 1952. Hemip. Afr. Noire, p. 113.
Cryptocarella Slater, 1957. Bul. Brooklyn Ent. Soc. 52: 36. **New synonymy.**

Type species: *Lygaeus excavatus* Fabricius, 1781. Monobasic.

The members of the genus *Aulacopeltus* are readily recognizable by the unique nature of the scutellum which is strongly swollen, and possesses a deep and broad median longitudinal trough. The pronotum is provided with a median carina that is usually somewhat enlarged at the apical margin, in some species very strongly so. The posterior pronotal margin laterad of the base of the scutellum is produced posteriorly as a pair of distinct depressed lobes. The labium is elongate, extending well onto the abdominal sternum.

Aulacopeltus is most closely allied to *Oncopeltus* showing its affinities in the swollen scutellum, the shape of the pronotum and in general habitus.

Distant (1911) distinguished his genus *Rhodesia* from *Aulacopeltus* by the former having the head entirely concealed beneath the inflated anterior portion of the pronotum. The subsequent nomenclatorial history of this generic name has been unfortunate. Bergroth (1916) noted that *Rhodesia* was preoccupied and renamed the taxon *Cryptocara.* Slater (1957) found that *Cryptocara* itself was preoccupied and again renamed the taxon as *Cryptocarella.* I have now examined what appears to be the unique type of *Rhodesia durbani* which is a female in the South African Museum at Capetown bearing the following labels: 1. "*Rhodesia durbani* Dist.", 2. "Natal. D'urban.", "N. Barker 1894" (on reverse side of label), 3. "Unique". Distant did not indicate where his specimen was deposited but presumably it was in the South African Museum. The specimen fits his description in all details. This specimen is a true *Aulacopeltus* in all essential respects. The anterior portion of the pronotum is indeed greatly inflated, much more so than in any other member of the genus, but *A. kilimandjariensis,* n. sp., also has a "hood" of considerable size (Fig. 3). The pronotal inflation is certainly only of specific value. The scutellum in *durbani* is somewhat crushed but its inflated nature is evident. *Cryptocarella* Slater is therefore synonymized with *Aulacopeltus* (Stal).

---

[1] Dept. of Zoology and Entomology, U. of Connecticut.

As noted above, the genus *Aulacopeltus* is confined in distribution to Africa and has hitherto been known only from the tropics. The inclusion of *durbani* in the genus extends the range southward to Natal where the presence of the genus must be interpreted as the southward extension of an essentially tropical element.

The genus at present is composed of four species, *excavatus* (F.), *minor* Distant, *durbani* (Distant), *kilimandjariensis,* n. sp.

Key to Species

1. Anterior mesal margin of pronotum strongly swollen and raised into a "hood-like" convexity (Fig. 3) 2
   Anterior portion of pronotum slightly elevated and enlarged, never strongly rounded nor having a "hood-like" appearance (Figs. 1, 2) 3
2. Hood-like anterior portion of pronotum extremely large, extending forward over base of head nearly to base of tylus; corium orange-red, with small black patch near base; pleural area adjacent to base of coxae dark, nearly uniform in color with remainder of pleuron . . . . *durbani* (Dist.)
   Hood-like area of pronotum much less strongly expanded (Fig. 3), head visible from above at least to area of ocelli; corium black or dark fuscous from base to beyond apex of

scutellum; pleural areas adjacent to coxae pale, contrasting with dark coloration of remainder of pleuron. *kilimandjariensis,* n. sp.

3. Postero-lateral angles of pronotum strongly flanged and extended posteriorly (Fig. 2.) .... *excavatus* (F.)
Postero-lateral pronotal angles very slightly produced posteriorly (Fig. 1.) .... *minor* Dist.

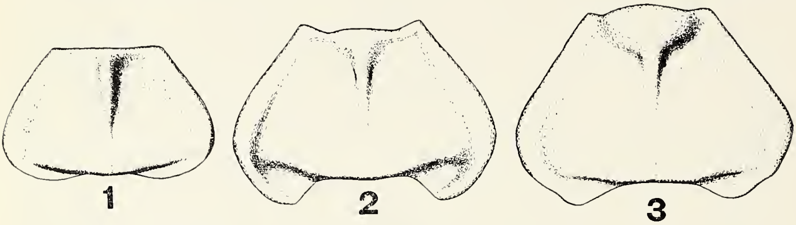


Fig. 1. Pronotum of *Aulacopeltus minor* Distant. Fig. 2. Pronotum of *A. excavatus* (F.). Fig. 3. Pronotum of *A. kilimandjariensis,* n. sp.

Aulacopeltus durbani (Dist.)

Rhodesia durbani Distant, 1911. Ann. So. Afr. Mus. 10: 41.
Cryptocara durbani Bergroth, 1916. Wien. Ent. Zeit. 35: 221.
Cryptocarella durbani Slater, 1957. Bul. Brooklyn Ent. Soc. 52: 36.

A. durbani is more closely related to *A. kilimandjariensis,* n. sp., than to the other members of the genus. Despite the fact that the inflated anterior portion of the pronotum is not of generic value it nevertheless is tremendously developed in *durbani* and will serve readily to distinguish this species. The "hood" is over three times as high in *durbani* as in *kilimandjariensis.* In addition, *durbani* has only a small dark spot near the base of the corium whereas in *kilimandjariensis* the entire basal half of the corium is black. Both species have a dark subquadrate pronotal patch on either side of the median ridge, black apices of the corium and black membrane.

A. durbani appears to be a very rare species for despite its large size and vivid black and red coloration no specimens other than the type specimen have been seen. Material examined: type female, D'urban, Natal as noted in generic discussion; in South African Museum.

Aulacopeltus kilimandjariensis, n. sp.

General coloration yellowish ochraceous, marked with reddish brown on median area of vertex; a broad area on pronotum on either side of median carina from behind area of calli to pronotal base, basal one-third of scutellum, basal one-half and apical one-fourth of corium shading from reddish brown to almost black fuscous; laterally on vertex adjacent to eyes, rectangular area about calli, extreme base of scutellum, entire membrane, broad patches on thoracic pleura, last abdominal segment and narrow triangular patches on lateral margins of preceding abdominal sternites (these becoming obsolete on anterior segments), blackish; remainder of venter bright orange; all appendages uniformly dark fuscous; a few weak scattered punctures on pronotal disc and mesally on scutellum; clothed rather thickly with very short, inconspicuous decumbent reddish brown to yellowish hairs.

Head subtriangular, very slightly declivent, ocelli set much closer to eyes than to one another, first antennal segment exceeding apex of tylus by nearly one-half its length, eyes in contact with antero-lateral pronotal angles. Length of head 1.55 mm., width across eyes 2.40 mm., interocular space 1.60 mm. Pronotum with a strongly developed median carina that becomes lower posteriorly and anteriorly expands into a broad convex hood-like area anterior to the calli; lateral margins very strongly narrowed anteriorly, broadly rounded in area of humeri and tumid or thickened laterally; posterior margin nearly straight in mesal area with excavated and strongly produced posterior lobes laterally (these, however, less strongly developed than in *A. excavatus* F.). Length of pronotum 3.10 mm., width 5.00 mm. Scutellum tumid, with the characteristic central excavation, length 2.85 mm., width 2.45 mm. Hemelytra with lateral corial margins convex and broadened posteriorly, with greatest width slightly beyond apex of scutellum, abdomen completely covered by hemelytra, membrane somewhat exceeding apex of abdomen, distance apex clavus-apex corium 3.40 mm., distance apex corium-apex abdomen 3.20 mm. (approx.). Posterior margin of metapleuron straight, legs not incrassate, mutic; labium extending onto abdominal sternite three (second visible sternite), first segment extending posteriorly to anterior edge of fore coxae, second segment reaching mesocoxae, third segment extending onto basal area of abdomen. Length of labial segments: I 2.00 mm., II 1.90 mm., III 1.85 mm., IV 1.35 mm. Antennae rather robust but linear throughout. Length of antennal segments: I 1.05 mm., II 2.65 mm., III 2.25 mm., IV 2.65 mm. Total length 13.00 mm.

Holotype: ♂, East Africa, Kilimandjaro, Sept. 22, 1905–6 (Sjostedt), in Stockholm Museum. *Paratypes:* 1 ♂, 1 ♀, East Africa, Kilimandjaro, Kibonoto, 2000–3500 m., Sept., 1905–6

(Sjostedt), in Stockholm Museum and author's collections.

Differs from *A. excavatus* (F.) by the less strongly flanged caudo-lateral expansions of the posterior pronotal margin, the darkened basal half of the corium and the characters mentioned in the preceding key.

Aulacopeltus excavatus (F.)

Cimex excavatus Fabricius, 1781. Spec. Ins. 2: 365.
Cimex excavatus Fabricius, 1787. Mant. Ins. 2: 301.
Cimex excavatus Gmelin, 1788. Syst. Nat. I. 4: 2174.
Lygaeus excavatus Fabricius, 1794. Ent. Syst. 4: 160.
Lygaeus excavatus Fabricius, 1803. Syst. Rhyng. p. 226.
Lygaeus excavatus Stal, 1865. Hemip. Afr. 2: 126.
Aulacopeltus excavatus Stal, 1874. Enum. Hemip. 4: 100.
Aulacopeltus excavatus Villiers, 1952. Hemip. Afr. Noire, p. 113.

This, the type species, is a large, brightly colored, orange and black insect. In specimens examined the corium is orange with the membrane and extreme apex of the corium black. The pronotum (Fig. 2) is only slightly swollen anteriorly along the median ridge. Lateral lobes of the posterior pronotal margin are very strongly developed, more so than in any other species of the genus. The pleural areas adjacent to the coxae are dark and unicolorous with the remainder of the pleuron. The legs are bright reddish brown.

I have examined the specimens from the Stockholm Museum studied by Stal and presumably from Central Africa.

Aulacopeltus minor Distant

Aulacopeltus minor Distant, 1905. Ann. So. Afr. Mus. 3: 57.

This species resembles *excavatus* in coloration and in lacking a strongly swollen anterior pronotal margin. It is a somewhat smaller species with very weakly developed lobes laterally on the posterior pronotal margin. The labium is very elongate, its third segment exceeding the hind coxae by more than one-half its length. The corium is uniformly light reddish orange except the extreme apex. The pleuron has large pale areas. The pronotum is marked with a dark ray close on either side of the pronotal ridge. The head is extensively darkened laterally. In one specimen studied the apical one-half of the scutellum is fuscous and the corium rather obscurely suffused with reddish brown.

A. minor was originally described from Nyasaland. Specimens from the Belgian Congo have recently been examined.

ACKNOWLEDGEMENTS

Sincere appreciation is extended to Dr. Norman T. Davis of the University of Connecticut for the preparation of illustrations used in the present paper and to Dr. Rene Malaise of the Stockholm Rijksmuseum and Dr. A. J. Hesse of the South African Museum for the loan of valuable material in their respective institutions.

A NEW PRIMITIVE PTILOMERA FROM THE HIMALAYAS AND OTHER NOTES (GERRIDAE, HEMIPTERA)

By HERBERT B. HUNGERFORD and RYUICHI MATSUDA*

In 1843 Amyot and Serville in their "Histoire Naturelle des Insectes, Hémiptères", p. 413, described the genus *Ptilomera* for *"Gerris laticauda* Hardw. (Trans. Linn. Soc. 16: 131)" and gave as localities "Java, Du Nepaul, suivant Hardwich". They made several mistakes. First, Major General Hardwicke described *Gerris laticaudata* (not *G. laticauda*) from Nepal and figured on Plate VI, p. 136, a winged adult and an apterous male that he labeled as larva. His types that remain in the British Museum are two males (one apterous and one macropterous). They were studied by Dr. Lundblad (1933). Amyot and Serville on Plate VIII, fig. 3, gave a colored figure of an adult apterous male, which they labeled *"Ptilomera laticauda* Hardw.". Yet they say in their description of the genus "Nous connaissons ce genre que a l'état de larve". Fortunately their figure gives the general facies of the male *Ptilomera,* but if it comes from Java we believe it was misidentified.

From Dr. Lundblad's drawings of the male type of *Ptilomera laticaudata* Hardwicke (Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, Java und Bali, Archiv für Hydrobiologie, Suppl. Bd. 12, Tropische Binnengewässer IV, p. 412, 1933) we are inclined to believe that the species is confined to Nepal and eastward in the Himalaya mountains.

We have found in the Torre-Bueno collection purchased by the University of Kansas some years ago four specimens bearing the label "Singla Darjiling, E. Himalayas, June 13, 1.500 ft. Ld. Carmichael". One female, unlike the other three, may possibly be the female of *Ptilomera laticaudata* Hardwicke, and we are figuring and describing it because it is unlike the female of any other species known to us and comes from nearer Nepal than any other we have seen. This identification cannot be certain until both sexes are taken from the same place.

---

* Contribution No. 1,001 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aid of a grant from the National Science Foundation.

Ptilomera laticaudata (Harwicke) ?
(Pl. I, Pl. II, G, H)

Size: Apterous female 14 mm. long (Hardwicke gives length of the male as 11 lines which would be about 23 mm., and that is the length of his drawing of the winged form. The drawing of his apterous male is 19 mm. long). Width across acetabula is 3.78 mm.

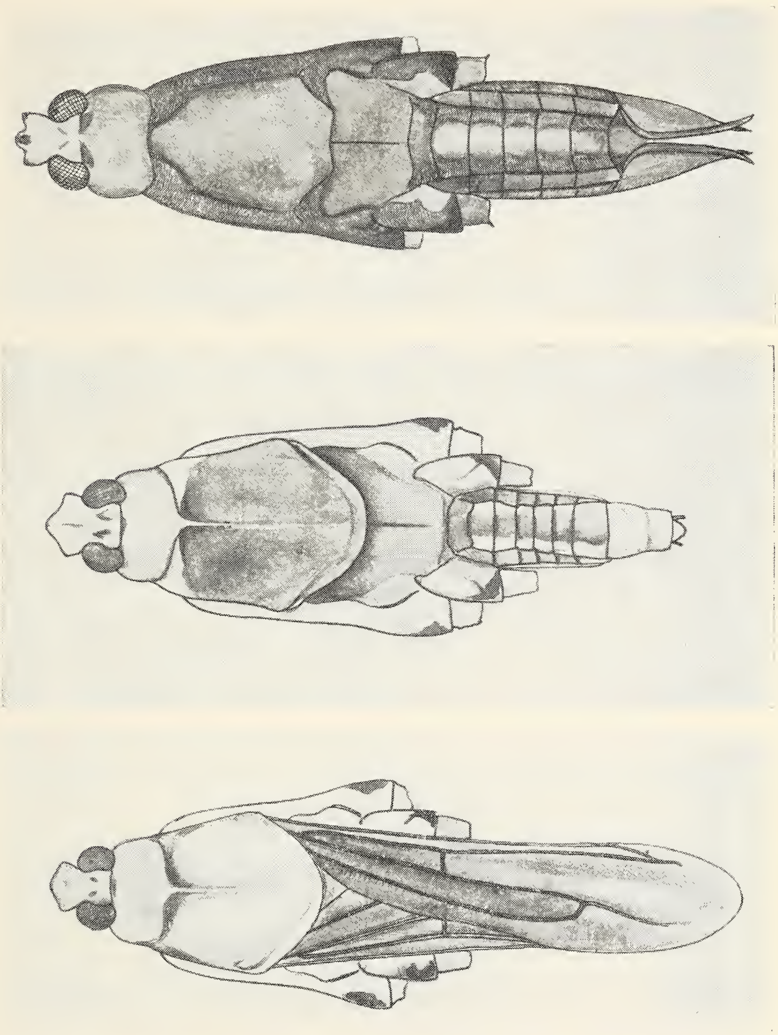
Color: Head and thorax rather reddish brown above, shining. Clypeus and four small spots between eyes dark. Pronotum with two transverse black spots on front margin. Mesonotum with anterolateral black areas and lateral black line covered with silvery pile, as is also metanotum. Abdominal tergites black, covered with silvery pile except a large round median testaceous spot on each segment. Venter pale testaceous, covered with a short silvery pile. Antennae brown. Front femora testaceous above, with two longitudinal brown lines; tibiae with a longitudinal brown line on outside. Middle and hind femora reddish brown; tibiae and tarsi darker.

Structural characteristics: Antennal formula : 1st : 2nd : 3rd : 4th :: 260 : 56 : 80 : ?. Female has prominent connexival spines that curve abruptly inward and then dorsocaudally and slightly surpass tip of upper lateral lobe of seventh abdominal segment; lower lateral lobe small but hides, in lateral view, depressed base of ventral median prolongation of seventh sternite, which in turn bends upward covering eighth segment. The modification of the seventh abdominal segment as described above is typical of

TABLE 1. **The relative lengths of leg segments.**

Front leg	Femur	Tibia	1st tarsal	2nd tarsal	Total tarsal length
Front leg	285	250	134	66	200
Middle leg	750	470	200	21	221
Hing leg	860	?	?	?	?

HUNGERFORD AND MATSUDA PLATE I



Top: *Ptilomera* (*Ptilomera*) *laticaudata?,* wingless female.
Middle: *Ptilomera* (*Proptilomera*) *himalayensis,* deälated male.
Bottom: *Ptilomera* (*Proptilomera*) *himalayensis,* winged female.

Ptilomera. The general facies, the shape of the antennae, the beak and eyes, the presence of a tooth or stout spine on the laterocaudal margin of the metacoxa as seen in the accompanying figures are all characteristic of all the previously described species of the genus *Ptilomera.*

Taken with the above by Lord Carmichael are three macropterous individuals, one of which is deälated. These specimens also possess the general facies, typical wing venation, typical shape of antennae, beak and legs of *Ptilomera,* but they lack the tooth or spine on the metacoxa and the genital segments of both sexes are simpler than in any other species of *Ptilomera* we have seen. The absence of the spine on the metacoxa would keep this species from running out to *Ptilomera* in Lundblad's key to the genera of Ptilomerinae. (Arkiv För Zoologi, Bd. 27A, N : O 14, p. 26, 1934). Of the nine genera assigned to this subfamily Ptilomerinae *Esakobates* Lundblad appears to be the most closely related to *Ptilomera* Amyot et Serville. We believe that our new species should be assigned to *Ptilomera,* but separated from other species by a different subgeneric name.

Ptilomera (Proptilomera) himalayensis, subgen. et sp. nov.

(Pl. I, Pl. II, A–F)

Size: Deälated male 12.3 mm. long; 3.36 mm. across humeri; 3.86 mm. across mesoacetabula. Macropterous male 14.4 mm. long, including wings; 2.8 mm. across humeri; 3.36 mm. across mesoacetabula. Macropterous female 14.44 mm. long, including wings; 2.94 mm. across humeri; 3.65 mm. across mesoacetabula.

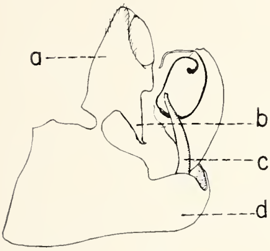
Explanation of Plate II

Ptilomera (*Proptilomera*) *himalayensis* Hungerford and Matsuda. A. Male front leg, outside view. B. Distal part of male front femur (a) and basal part of tibia (b), ventral view. C. Male antenna. D. Male genital segments, lateral view: a—suranal plate, b—lateral projection of the suranal plate, c—paramere, d—pygophore. E. Female apical abdominal segments, ventral view: a—prolongation of seventh sternite, b—lobe of eighth segment. F. Female apical abdominal segments, lateral view.

Ptilomera (*Ptilomera*) *laticaudata* Hardwicke? G. Female apical abdominal segments, dorsal view. H. Same, lateral view: a—connexival spine, b—upper lateral lobe.

Ptilomera (*Ptilomera*) species from South India. I. Hind tarsus as seen under compound microscope.

HUNGERFORD AND MATSUDA PLATE II



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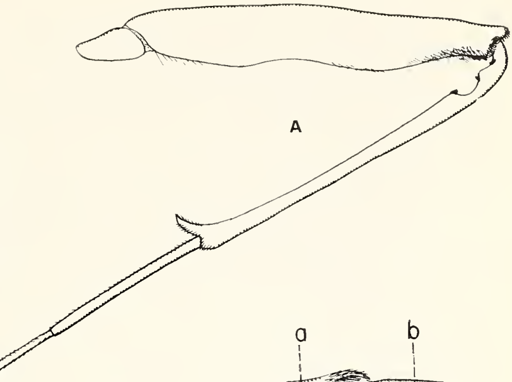

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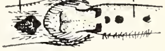

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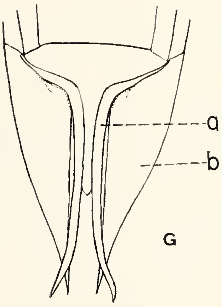

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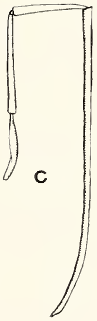

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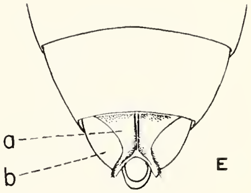

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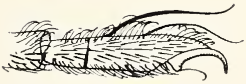

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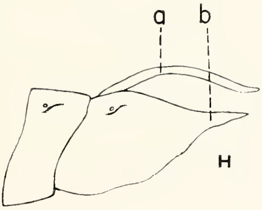

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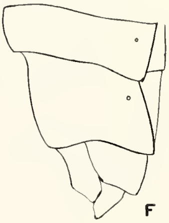

F

The wings surpass abdomen by 3.3 mm. in male and by 2.5 mm. in female.

Color: Reddish brown to testaceous above, wings brown. Head with two or more indefinite embrowned spots. Prothorax with a black spot on anterior median margin; a transverse band on anterior margin of posterior lobe broken in the middle by a low testaceous carina; sides of anterior lobe with a longitudinal black band not reaching to eyes and a large spot on proacetabula. Mesothorax with a lateral black band broader in front, and reaching back onto metaacetabula; mesoacetabula with a black spot. Venter pale testaceous, covered with short silvery pile. Abdominal tergites of deälated male with black bands, covered with silvery pile across bases of first four segments. Antennae brown. Legs testaceous to reddish brown; anterior femora with two longitudinal reddish brown bands; middle and hind femora pale testaceous at tips.

Structural characteristics: Antennal formulae of male : 1st : 2nd : 3rd : 4th : : 265 : 62 : 95 : 55. Last segment somewhat curved and flattened. Beak barely touching mesosternum.

TABLE 2. **The relative lengths of leg segments in the holotype male.**

	Femur	Tibia	1st tarsal	2nd tarsal	Total tarsal length
Front leg	300	260	120	60	180
Middle leg	820	500	308	34	342
Hind leg	990	?	?	?	?

In the hind leg of the deälated paratype male, which is larger than the holotype, the femur is 1180, tibia 683, and the tarsus 17. It is impossible to see the tarsal segmentation without clearing and examining under compound microscope; the tarsal segmentation in one species of *Ptilomera* from South India is shown in Plate II, Fig. A. Front femur of male is rather stout and has a characteristic shape as shown in Plate II, Figs. A and B; female front femur is normal in shape and provided with a small black protuberance ventrally near distal end; this protuberance is larger in male. Tibia of front leg also has three small protuberances on the inner base; these protuberances are smaller in female than in male. Male middle femur with densely ciliated ventral margin confined to distal two fifth; basal three fifth bare. Dorsal surfaces of both middle and hind femora with many shiny stout black spicules. Metacoxal spine represented by a short blunt black protuberance. Male suranal plate rather small; lateral projection slender, inconspicuous and curved caudally at tip. Pygophore short and simple, broadly rounded caudally. Paramere slender, distal end curved dorsally as shown in Plate II, Fig. D. Female terminal abdominal segments are as shown in Plate II, Figs. E and F. Prolongation of seventh sternite narrow, bifurcate at tip and with a median longitudinal carina. It exposes laterally the eighth segment which in most species of *Ptilomera* is hidden beneath the broad and reflexed caudal prolongation of seventh segment.

Comparative notes: The lack of the metacoxal spine and of the connexival spine in the female separates this subgenus from *Ptilomera s. str.*

Location of types: The holotype macropterous male, allotype macropterous female and the deälated male paratype bear the label "Singla Darjiling, E. Himalayas, June 13 1.500 ft. Ld. Carmichael". These are in the Francis Huntington Snow Collection, University of Kansas.

Predatism in a Parasitized Caterpillar: In late June, 1941, a noctuid larva of unknown species was found in Amherst crawling over the cocoon of an eastern tent caterpillar. A day later it was noted that the entire cocoon, as well as the pupa therein, had been devoured by the larva. Another cocoon was offered the still active caterpillar, and it too was quickly consumed. But all thoughts of rearing this remarkable predatory larva ended abruptly when, a day or two later, a plump tachinid larva, of undetermined species, emerged from it, and the one-man tent caterpillar control program came to an end. Now, cannibalism among lepidopterous larvae is not unknown, but in this case was the predatism on the part of a presumably plant-feeding caterpillar a result of its parasitism, a compelling drive to devour anything and everything in a fruitless attempt to satisfy those very literally "gnawing" pains of a terrible hunger? One's sympathies are surely with the caterpillar.—Marion E. Smith, Amherst, Mass.

THE FACIAL AREAS, LABRUM, EPIPHARYNX, HYPOPHARYNX AND MANDIBLES OF THE LARVA OF *ANOPHELES QUADRIMACULATUS* SAY[1]

By James H. Menees, Cornell University

The problem of interpreting the morphology and anatomy of the head capsule and mouthparts of larval Diptera has long received the attention of entomologists. Although many interpretations have been given, a satisfying explanation of the homologies of the larval mosquito head capsule and mouthparts with structures found in a generalized insect has yet to be given. This paper, which is the second part of a critical inquiry into the larval head capsule and mouthpart structures of *Anopheles quadrimaculatus,* considers the facial areas of the cranium, the labrum, the epipharynx, the hypopharynx, and the mandibles. The first part of this study (Menees, 1958) considered the maxilla and labium.

The literature concerned with the morphology and anatomy of the head capsule of larval Diptera contains terms and interpretations partially incorrect. Although investigators have exhibited a broad knowledge of generalized cranial and mouthpart structures, they have not perceived the dimensions which forms and parts may have in space and yet maintain a characteristic relationship to a hypothetical and geometrical space-time form. As Thompson (1942, pp. 2–3) has so aptly put it "the zoologist or morphologist has long been slow, where the physiologist has long been eager, to invoke the aid of the physical or mathematical sciences; and the reasons for this difference lie deep, and are partly rooted in old tradition and partly in the diverse minds and temperments of men. . . . In short, he is deeply reluctant to compare the living with the dead, or to explain by geometry or by mechanics the things which have their part in the mystery of life."

In the morphological and anatomical descriptions and analyses that follow, comparisons between related larval forms, and insects and arthropods in general, have been given with the hope that the reader will readily comprehend the analogies and homologies drawn.

The Definitive Insect Head

Before progressing further, certain definitions and concepts must be made as to the sclerites and sutures which make up the facial aspect of the generalized insect cranium and the muscles which are associated with these areas. The following explanation can be applied to the cranial areas of both hypo- and prognathous types of insect heads.

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[1] Acknowledgment is made to the Grace H. Griswold Fund for assuming a part of the cost of publication.

The facial areas. The facial areas of the cranium of the definitive insect head (Figs. 1, 2 & 4) may be considered as being made up of the frons (fr), clypeus (clyp), and the labrum (lbr). The frons is bordered laterally by frontal sutures (fs), posteriorly by a coronal suture (cs), and anteriorly by an epistomal suture (eps). Within the epistomal suture lie the anterior tentorial pits (atp). The epistomal suture generally functions to form a brace in the region between the anterior mandibular articulations (ama). The typical position of the epistomal suture is on a line between the mandibular bases passing through the roots of the anterior arms of the tentorium (Snodgrass, 1928). In pterygote insects, Snodgrass (1935) says that the anterior arms of the tentorium usually arise from the internal inflection of the epistomal ridge, and their external pits which lie in the epistomal suture serve to identify this suture when the latter is likely to be confused with neighboring sutures. The clypeus is the morphological area that lies anterior to the epistomal suture, and anterior to the clypeus is the labrum; most workers recognize a clypeo-labral suture (cls) as dividing morphologically the clypeus from the labrum. Laterally (Fig. 2) a subgenal suture (pls, hs) lies above the bases of the gnathal appendages and is continuous with the epistomal suture when the latter is present. The subgenal suture generally extends from the posterior tentorial pits (ptp) to a point just above the anterior articulation of the mandibles (ama). For descriptive purposes the part of the subgenal suture lying above the mandible is called the pleurostomal suture (pls), while the part posterior to the mandible is called the hypostomal suture (hs). This generalized condition can easily be reconciled with the mosquito larval head capsule (see Fig. 6).

Labral musculature. The musculature of the labrum (Figs. 9, 10 & 11) generally consists of a pair of labral compressors (lbrc) which are found within the labrum and which have their origins and insertions on the ventral and dorsal walls respectively. A pair of anterior labral retractors (arlbr) are inserted on the dorsal margin of the labral base, sometimes laterally, sometimes medially; another pair of labral muscles, the posterior retractors of the labrum or tormal muscles (torm) insert on the tormae. The anterior retractors of the labrum and the tormal muscles usually have their origins on the upper part of the frons (see Figs. 3 & 5, arlbr & torm; Fig. 4, lbrm).

Epipharynx. The ventral surface of the labrum and clypeus is generally recognized as the epipharyngeal wall or the epipharynx. At the lateral angles of the epipharynx between the labrum and clypeus a pair of small sclerites called tormae are found (Figs. 9, 10 & 11, tor). The tormae generally extend into the epipharyngeal surface of the clypeus. Thus, even on the epipharynx the clypeus can be distinguished morphologically from the labrum by the presence of the tormae.

Hypopharynx. The hypopharynx (Fig. 12) is generally recognized as being a large median lobe on the ventral wall of the gnathal region which lies between the mouth opening (mo), the salivary duct opening (sdo) and the base of the labium (lab). But in some insects the salivary duct opening is placed on the hypopharynx and the hypopharynx is traversed by a salivary canal (adult Hemiptera, Diptera; Snodgrass, 1935). When the hypopharynx and labium are united, as in many insect larvae, the salivary duct opening may lie at the tip of a combined labio-hypopharygneal structure (Snodgrass, 1928). Anthon (1943) figures this for the larvae of nematocerous Diptera. The cibarium, or preoral food chamber, is the space between the adoral base of the hypopharynx and the epipharyngeal surface of the clypeus. The cibarial muscles (Fig. 4, cbm) have their origin on the dorsal wall of the clypeus anterior to the frontal ganglion (fg) and their insertions on the dorsal wall of the cibarial chamber, the latter being the clypeal part of the epipharynx.

The lateral walls of the hypopharynx (Fig. 12) usually contain sclerotized bars which may extend to the salivarium (sdo). These bars generally form the suspensorium of the hypopharynx. Each suspensorium (x) connects distally with the anterior end of a lateral sclerite (w), while the proximal end (y′) enters the lateral angle of the mouth where it ends in the stomodaeal wall and gives insertion to the retractors of the mouth angle (rma). In some cases each suspensorial bar may have a proximal branch (y) that extends laterally to the base of the adductor apodeme of the mandible (apad) as in the grasshopper (Snodgrass, 1935). It is evident that the sclerotized suspensorial bars of the hypopharynx (w, x, y, y′), which Snodgrass (1928) says appear to be chitinous remnants of the mandibular sternum, have an intimate relationship not only with the mandibles but may have structural association with the ectoderm around the mouth opening and the labium.

Morphologically the hypopharynx lies between the mouth and the bases of the mandibles, and hence it may represent the venter of the postoral tritocephalic somite of the head (Snodgrass, 1935). Snodgrass implies by this that the hypopharynx may have some type of anatomical continuity with the tritocephalic somite. If Butt's (1957) statement is accepted, namely that the appendage lobes of the tritocephalic somite are the labral lobes, then it is implied that the hypopharynx and its suspensorial bars may have an intimate structural association with the labral *or* clypeal area. The hypopharynx itself represents the fused sternites of the mandibular and first maxillary segments in the roach (Riley, 1904) or the sternites of the mandibular and both maxillary segments in *Locusta* (Roonwal, 1937). Such an origin of the hypopharynx also occurs in *Forficula* and several Hemiptera (Heymons, 1895, 1899). *In other insects the hypopharynx appears to be associated with the intercalary, or premandibular, region also,* and Hirschler (1924) suggests that the intercalary or premandibular segment also shares in the formation of the hypopharynx.

But again, looking at the spacial arrangement of these areas, the epipharyngeal surface of the clypeus and its ectoderm is more intimately associated with the hypopharynx than is the labrum with the hypopharynx. With such an association, the suspensorial bars of the hypopharynx may have a tendency to fuse with not only sclerotic elements of the clypeus but also with elements of the labium to form a very rigid type of sclerotic bar bracing; this bracing mechanism would include the anterior articulations of the mandibles and would extend from the lateral areas of the clypeus to the lateral areas of the labium. This extremely important hypothetical consideration will be discussed at length below in connection with the larval head capsule of *A. quadrimaculatus.*

Hypopharynx and tentorium. Snodgrass (1928) says that in *Machilis* the outer ends of the hypopharyngeal supports are broadly fused with the basal angles of the clypeus, and in Chilopoda and apterygotan insects, an apodemal process arises from the inner ends of each suspensorial plate of the hypopharynx and these apodemes are sternal apophyses of the head. Moreover, Snodgrass says that the tentorium must have some relationship with the hypopharyngeal apophyses of the Apterygota and Chilopoda and with the sternal apodemes of the gnathal segments in Crustacea. He goes on to say that the anterior tentorial arms are identical with the hypopharyngeal apophyses of the Myriopoda and Apterygota and that the anterior tentorial arms have their prototypes in the ventral apodemes of the gnathal segments in Crustacea. From their positions laterad of the hypopharynx, Snodgrass says that the bases of the hypopharyngeal apophyses (anterior tentorial arms) have moved outward from within the ventral wall of the head and before the bases of the mandibles to the lateral ventral edges of the cranium, where they come to lie in the subgenal suture; and proceeding forward the anterior tentorial arms have migrated to the epistomal suture on the facial aspect of the head. Essentially, then, the anterior tentorial arms have arisen from hypopharyngeal suspensorial bars. It may be evident, then, that the anterior tentorial arms are intimately associated with the hypopharynx, which may be a sternal region of the mandibles, and also that the hypopharynx is intimately associated with the labium. This condition of clypeal, hypopharyngeal, mandibular and labial elements being intimately associated, in fact fused with the anterior tentorial arms is dramatically evidenced in the larval head capsule of *A. quadrimaculatus* (see Fig. 6), and an analysis of this condition will be given below.

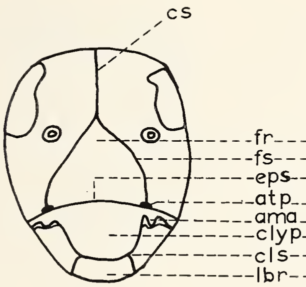
Mandibular articulations. A discussion of the mandibular articulations will also help show the intimate structural and functional relationship these mouthpart elements have with other areas of the head capsule.

The typical arthropod mandible has primarily only a monocondylic hinge articulation on the tergum of the mandibular segment, as in apterygotan insects (Snodgrass, 1951). Very com-

Explanation of Plate I

Figs. 1 & 2, frontal and lateral areas of definitive insect head (after Snodgrass, 1935). Fig. 3, dorsal facial areas of *A. quadrimaculatus* showing muscle origins in relation to frontal ganglion. Fig. 4, diagram showing facial areas and muscle origins of hypothetical insect (after Snodgrass, 1947). Fig. 5, facial areas of *Chironomus* showing muscle origins in relation to frontal ganglion (after Cook, 1944b). Fig. 6, fronto-lateral view of KOH'ed larval head capsule of *A. quadrimaculatus;* this is a camera-lucida drawing showing a ¾ frontal-lateral view of the paraclypeo-hypopharyngeal-labial bracing structure (i.e., pclyphrg, eps, hyps & lahypb) and the relationship this structure has to the mandibular articulations (ama, amp), to the frons and clypeus, to the pleurostomal and hypostomal sutures (pls, hs), and to the anterior and posterior tentorial arms (ata, pta) ; the anterior and posterior tentorial arms are denoted by broken lines because they are seen through the KOH'ed head capsule; the labrum, mandibles and maxillae have been cut away from the head capsule also.

MENEES PLATE I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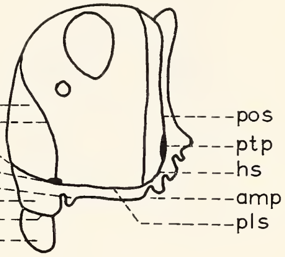
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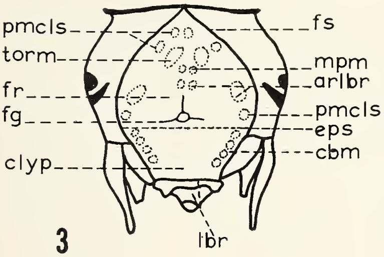
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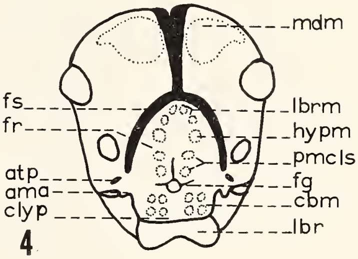
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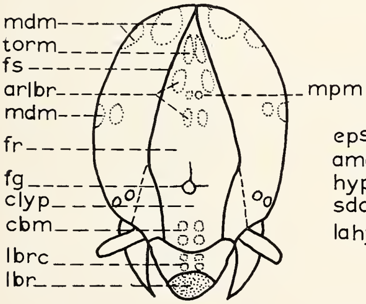
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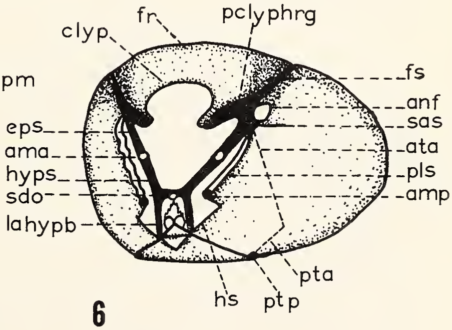
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monly, however, the movement of the mandible is restricted to that of a hinge by the establishment of a second articulation on the anterior margin of the mandible, thus changing the hinge articulation of the mandibles from monocondylic to dicondylic, as in pterygotan insects. The place of the secondary articulation of the mandible on the head capsule varies in the different groups of arthropods, but *in pterygotan insects the secondary or anterior articulation is on the clypeus* at the base of the labrum (Fig. 2, ama), while the primary, posterior articulation is near the junction of the pleurostomal and hypostomal sutures (Fig. 2, amp).

With the evolution of the mandible, the mandibular base has reversed the tilt of its hinge line. In apterygotan insects the tilt, or slope of the hinge line is down and forward from the primary, posterior monocondylic articulation; but with the dicondylic mandible of pterygotan insects the base of the mandible tilts downward and posteriorly from the secondary, anterior articulation.

In the case of apterygotan insects, with a monocondylic articulation, the hinge during adduction causes the mandible to swing inward and anteriorly, while in pterygotan insects with a dicondylic articulation the slope of the hinge at adduction causes the mandible to swing downward and posteriorly from the secondary, anterior articulation. Thus with insects having the hypognathous type of head, the hinge slope of the dicondylic mandible is more horizontal, while in the prognathous type, as in the larva of *A. quadrimaculatus,* the hinge slope is more vertical. But in both the hypo- and prognathous conditions there is no change in the morphological and anatomical relationship of the mandibles to the head capsule.

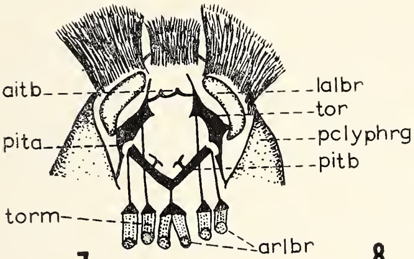
LARVAL HEAD CAPSULE OF *A. quadrimaculatus*

Facial areas. The head capsule of *A. quadrimaculatus* (Figs. 3 & 6) is of the prognathous type. The dorsal facial areas consist of a large frons-clypeal area which is bordered laterally by

EXPLANATION OF PLATE II

Fig. 7, epipharyngeal area *A. quadrimaculatus.* Fig. 8, epipharyngeal area of *Chironomus* (after Gouin, 1957). Fig. 9, epipharyngeal area of grasshopper (after Snodgrass, 1928). Fig. 10, epipharyngeal area of roach. Fig. 11, labral muscles of *Corydalus* (after Kelsey, 1954). Fig. 12, hypopharynx of grasshopper (after Snodgrass, 1935). Figs. 13 and 14, epipharyngeal areas of Chilopoda and Symphyla respectively (after Snodgrass, 1951).

MENEES PLATE II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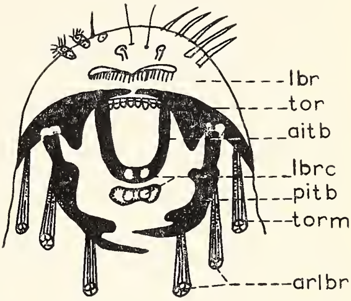
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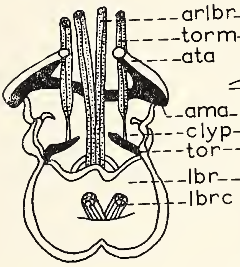
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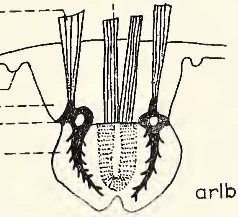

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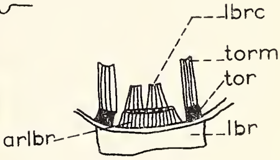
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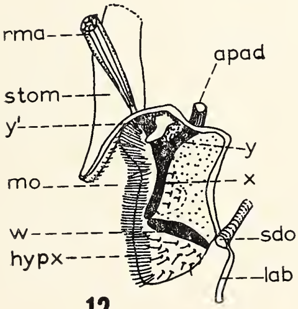
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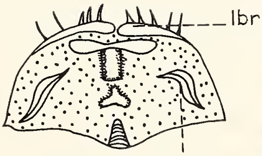

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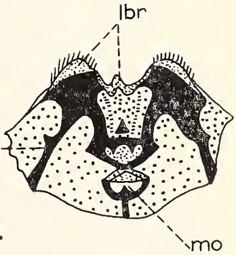

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frontal sutures (fs) and posteriorly by a much reduced coronal suture (cs). The frontal sutures theoretically extend anteriorly from the coronal suture to the lateral posterior area of the clypeus where they meet the epistomal suture. Crampton (1921) says that the anterior prolongations of the arms of the frontal sutures which extend forward into the clypeal region are called the paraclypeal regions. The paraclypeal region is quite prominent in the larva of *A. quadrimaculatus* and forms a paraclypeal fold on each side of the clypeus (Fig. 6, pclyphrg) to add structural support to the cranium. DuPorte (1957) calls the paraclypeal fold the frontogenal inflection, but this area is morphologically more closely associated with the clypeus and other structures to be considered later than with the frons and gena.

An epistomal suture is absent in this larva; but if a hypothetical line (Fig. 3, eps) is drawn from the point of origin of the paraclypeal fold on one side, posterior to the origins of the cibarial muscles (cbm), across to a similar point on the opposite side of the head capsule, then this line represents the region the epistomal suture would occupy if it was present and it divides morphologically the frons from the clypeus.

Functionally there is no need for an epistomal suture to cross the head to increase the median bracing of the head capsule. This is evident from the fact that the paraclypeal fold (Fig. 6, pclyphrg & eps) has fused with the hypopharyngeal suspensory bars (hyps) and labium to form a more functional type of bracing for the head capsule. This explanation is in partial agreement with Kelsey's (1954) explanation concerning the epistomal suture in the larva of *Corydalus.* Kelsey says "the epistomal sulcus, which is interrupted medially, continues laterally from the anterior tentorial pits to join the subgenal sulcus and finally the hypostomal sulcus ventrally; it forms an internal ridge which braces the lateral portion of the head. Dorsally this internal ridge contains the anterior mandibular articulations at the lateral edge of the clypeus. The subgenal sulcus and the hypostomal sulcus extend to the ventral side of the head, where they end at the ventral mandibular articulation." The latter is likewise evident in *A. quadrimaculatus,* although modified to some extent.

At the point of fusion of the paraclypeal fold with the anterior tentorial arms (Fig. 6, pclyphrg, ata) and the pleurostomal suture (pls) another sclerotized bar (eps, hyps) extends diagonally in a ventral direction to meet with the dorsal part of the combined labio-hypopharyngeal body (lahypb). This sclerotized, bar-like structure, which has been called the cibarial bar by Cook (1944a).

and Farnsworth (1947), bears the anterior articulations of the mandibles (ama). The part of this bar which lies above (eps) the anterior articulations of the mandibles is a lateral part of the clypeus (see also Fig. 2, ama). The part of this bar which lies below the anterior articulations of the mandibles is homologous with the hypopharyngeal suspensorial bars of generalized insects (see Fig. 12, w, x, y, y′).

Labrum and labral musculature. The labrum (Fig. 3, lbr), which is very much reduced dorsally, consists of a thin transverse sclerotized area basally and a more membranous, lobe-like area distally. Shalaby (1956) calls the thin transverse sclerotized area the preclypeus, but generally the preclypeus is separated from the postclypeus by a membranous area or else the preclypeus is membranous.

The muscles of the labrum (Fig. 7) are homologous with the labral muscles of generalized insects (see Figs. 9, 10 & 11). There is one pair of tormal muscles (torm) each one inserting anteriorly on each torma. These muscles are the true tormal muscles or posterior retractors of the labrum. There are two pairs of labral retractors (arlbr) or anterior labral retractors. The outer pair insert on the lateral ends of the posterior inter-tormal bar (see Fig. 7, pitb), while the inner pair insert on the median V-shaped portion of this bar. All the labral muscles have their origins on the frons and posterior to the frontal ganglion (see Fig. 3, arlbr, torm). The compressors of the labrum are absent in this larva. This can be explained by the fact that the labrum is so much reduced dorso-ventrally that there is no functional need for compressors, and also by the fact that the tormal and labral retractor muscles have taken over the function of compressing the labrum when these muscles retract the labrum toward the mouth opening.

Epipharynx. The epipharyngeal area of the labrum (Fig. 7) contains a number of small sclerites. The lateral palatal plate (Cook & Farnsworth) or the lateral labral plate (Shalaby) is nothing more than a sclerotic remnant of the lateral area of the labrum (lalbr.). The so-called messores (Cook, 1944a) are homologous with the tormae of generalized insects (see Figs. 7, 9, 10 & 11, tor), and the small, bar-like sclerites which connect the tormae anteriorly and posteriorly are the anterior and posterior inter-tormal bars (Fig. 7, aitb, pitb). Farnsworth says that the posterior tips of the messores (tormae) are articulated to the anterior extension of the paraclypeal fold (see Fig. 7). This is truly the case, and as was stated previously the paraclypeal fold represents a lateral part of the clypeus which has become displaced lateroventrally to articulate with the tormae and thus to define not only the tormae but also the epipharyngeal surface of the clypeus.

In the literature there is disagreement and confusion among workers concerning the sclerites found on the epipharynx of larval Diptera and especially concerning the sclerites I have called the tormae. Goetghebuer (1912, 1924) called similar structures premandibles because they resembled small mandibles and were functionally and morphologically anterior to the mandibles. Goetghebuer believed these structures to be appendages of the embryonic premandibular (intercalary, tritocephalic, second antennal, cheliceral) segment because they were innervated from the tritocerebrum. Goetghebuer's term "premandibles" denotes apparently only a morphological area which is anatomically associated with the tritocephalic segment. Butt (1957) states that the tritocephalic lobes (premandibular, intercalary, etc.) form in the anterior trunk segment and migrate around the stomodaeum to fuse with the brain and that the appendage lobes of this segment of the tritocerebrum are the labral lobes. This infers that the whole of the labrum is the appendage lobes and means that the so-called premandibles cannot be appendage lobes also but that they are only a functional part of the labral appendage lobes.

Sclerites appearing on the epipharyngeal area of Chilopoda and Symphyla (Figs. 13 & 14, z) and which may be homologous with the tormae of insects, are called "epipharyngeal arms of the premandibular sternal plate of the head" (Snodgrass, 1951). In respect to the epipharyngeal area of Symphyla, Tiegs (1940) states from a study of the embryogeny of *Hanseniella,* that "the most noteworthy fact which the development of *Hanseniella* has revealed is that much of the roof of the preoral cavity is actually a derivative of the premandibular epidermis"; furthermore, Tiegs says "there is little doubt that this must hold also for insects." In reference to the epidermis of the premandibular segment in *Pauropus* (Myriopoda), Tiegs (1947) says "this epidermis later plays a large part in the formation of the clypeus, and it is therefore evident that, as in Symphyla, this part of the head-capsule must be largely of pre-mandibular origin. (Both in insects and myriopods the innervation of the clypeus and labrum from the tritocerebrum has long been known.)" Snodgrass (1951) adds to this "if we may assume that the myriopods, symphylids, and insects once had functional premandibular appendages, which secondarily acquired a preoral position by the forward folding of the ventral part of this segment around the sides of the mouth, as do their presumed homologues, the second antenna of Crustacea and the chelicerae of

Arachnida, then Tieg's observation on *Hanseniella* becomes a noteworthy verification of what might be assumed to be a fact."

According to Sedgwick (1894) the general tendency was for ancestral structures, or organs, to be blotted out unless they were of some value to the organism in its free-living larval state and were therefore perpetuated. This appears to be the case with the extreme modifications of the sclerites found on the epipharynx of *A. quadrimaculatus* and other larval Diptera, for when the tormae and other inter-tormal structures of larval Diptera are compared with similar structures in other arthopods, one then begins to visualize the numerous modifications that have evolved on the epipharyngeal surface of the tritocephalic segment to accomplish the structure and function of feeding. The latter implies some form of "adaptation." Thompson (1942, p. 1035) in his chapter "On the Theory of Transformations or The Comparison of Related Forms" says ". . . it is essential that our structure vary in its entirety, or at least that 'independent variants' should be relatively few. That independent variations occur, that localised centres of diminished or exaggerated growth will now and then be found, is not only probable but manifest; and they may even be so pronounced as to appear to constitute new formations altogether." Also, Kleinenberg (1886) in his "substitution theory" says that new organs or structures (the variations of the tormae and intertormal sclerites) arise in an ontogeny not by a morphological variation of the replaced or preceding organ (second antennae, etc.) but by a genetic relation to it such that the new can arise only in an organism containing the old, i.e., that it is dependent on the prior existence of the replaced organ. If this is true then it is apparent that the tormae could have been at one time only part of the appendages of the tritocephalic segment. And if the appendage lobes of the tritocephalic segment are the labrum itself, then the tormae, premandibles, messores, etc., cannot be an appendage of this segment also; the tormae must be sternal, ectodermal parts of the appendage lobes of the tritocephalic somite which are independently moveable by muscles inserted on their bases. This analogy can be carried further when one thinks of the galea and lacina of the maxilla or the glossa and paraglossa of the labium as being only parts of a gnathal appendage, these parts being likewise independently moveable in relation to the whole appendage.

Comparative anatomy and morphology of the epipharynx. The anatomy and morphology of the epipharynx of *A. quadrimaculatus* appears to be homologous to that of the epipharynx of *Chironomus*. This may be seen from a comparison of the origins and insertions of the labral and tormal muscles and from a comparison of the epipharyngeal sclerites found in the head capsule of these two larvae (see Figs. 3 & 5, torm, arlbr; Figs. 7 & 8, torm, arlbr, tor, aitb & pitb). In making comparisons one should keep in mind also the differences in larval environment between these two larvae, for these differences may have some bearing on the variations in form of the epipharyngeal elements.

Probably the best insight into the comparative homology of the epipharyngeal structures in these two larvae is the following anatomical observations: in *A. quadrimaculatus* the lateral pair of labral retractors (Fig 7, arlbr) insert on the lateral ends of the posterior inter-tormal bar close to the points where the posterior inter-tormal bar articulates with the tormae (pita); the median pair of labral retractors insert at the point of the V, formed by the posterior inter-tomal bar. From the above observations it may be evident that there are two pairs of labral retractors, a median and a lateral pair, both of which insert on the posterior inter-tormal bar. The above anatomical situation is very similar in *Chironomus,* although the posterior inter-tormal bar in *Chironomus* (so-called premandibles) is not fused posteriorly to form a V.

Gouin (1957) calls the posterior inter-tormal bars in *Chironomus* gr *plumosus* L. the premandibles. And he says that the posterior inter-tormal bars articulate with the tormae and that between the tormae there is another U-shaped sclerite which also articulates with the tormae. The muscle insertions and origins for the tormal sclerites of *Chironomus* as given by Gouin appear to be homologous with those of *A. quadrimaculatus.*

The U-shaped sclerite and the premandibles of *Chironomus* are homologous with the anterior and posterior inter-tormal bars of *A. quadrimaculatus* respectively. This may be evident not only from the comparative spacial morphology of these elements and their articulation with the tormae, but it is also even more evident from the comparative anatomy of the muscle insertions and origins of these tormal elements in the head capsules of these two larvae.

The labrum in *A. quadrimaculatus* appears to be so reduced dorso-ventrally and laterally that the tormal sclerites have been compressed laterally on the epipharynx and therefore fused. While in *Chironomus* the labrum is not so reduced and the tormal sclerites are broken up and distributed over more of the epipharyngeal surface. If one mentally breaks up the tormal structures of *A. quadrimaculatus* and distributes them in the same directions on the epipharynx as the tormal structures of *Chironomus* are distributed morphologically, then not only will each tormal part be homologous but the muscle insertions and the relative origins of these muscles on the frons of each larval head capsule will also be homologous.

Hypopharynx. The hypopharynx is a part of a composite structure (Fig. 6, lahypb). The hypopharynx has fused with the labium to form a compact labio-hypopharyngeal body, and it has fused with the lateral areas of the clypeus, which contains the anterior articulations of the mandibles (ama), to form the major bracing structure of the head capsule. The salivary duct opening, which generally lies at the base of the hypopharynx and which may be used as a landmark to define the basal limits of the hypopharynx, has moved dorsally and lies at the tip or dorsal part of this combined paraclypeo-labio-hypopharyngeal structure.

Mandibular articulations. As was stated previously the anterior articulations of the mandibles (Fig. 6, ama) lie medially on the bar-like structure that contains the fusion elements of the lateral parts of the clypeus and the hypopharyngeal suspensorial bars. The posterior articulations (amp) lie in the subgenal suture at the ventral base of the maxillary palpus. An elongate, sclerotized bar extends ventrally from the mandible to articulate with the cranial wall of the subgenal suture at the base of the maxillary palpus. Farnsworth states that this bar-like extension extends around the base of the maxillary palpus to aid in support of the palpus.

The hinge plane of the mandibles at adduction moves more nearly in a vertical slope because of the prognathous condition of the larval head capsule. And as was stated by Menees (1958) this type of hinge plane coincides with the apparent inter-relationship of the mandibular molar areas being able to partially crush food particles on the lateral areas of the labio-hypopharyngeal body during adduction of the mandibles.

From the above discussion it may be apparent that both the anterior and posterior articulations of the mandibles have commenced to be displaced more internally (i.e., towards the mouth opening and pharynx) and have a definite internal relationship with the clypeus, hypopharynx, and maxilla. These facts, I think, may fall in line partially with Hennig's (1948) views for the development of the larval head capsules of Diptera in general, from lower forms to higher forms.

Tentorium. The tentorium (Fig. 6) of *A. quadrimaculatus* is very much reduced and weak in structure, this being made up for by the fusion of the paraclypeal fold with the hypopharyngeal suspensorial bars and the labium to form the major bracing mechanism of the head capsule. The only muscle which inserts on the tentorium is the antennal muscle.

The anterior tentorial arms (ata) originate near the point of fusion of the pleurostomal suture (pls) with the paraclypeal fold (pclyphrg) and subantennal suture (sas); there are no anterior tentorial pit invaginations. The anterior tentorial arms are much longer than the posterior tentorial arms (pta).

The posterior tentorial arms arise from definite posterior tentorial pit invaginations (ptp). These invaginations lie on a line drawn posteriorly from the ending of the hypostomal sutures (hs) to the lateral corners of the foramen.

In summary, it may be said that although the larval head capsule of *A. quadrimaculatus* shows considerable modifications and reductions of parts, it still retains the essential elements of structure and function such as those found in the heads of generalized insects and arthropods in general.

Abbreviations

aitb—anterior inter-tormal bar; ama—anterior articulation of mandible; amp—posterior articulation of mandible; anf—antennal foramen; apad—adductor apodeme of mandible; arlbr—anterior retractors of labrum; ata—anterior tentorial arms; cbm—cibarial muscles; cls—clypeo-labral suture; clyp—clypeus; cs—coronal suture; eps—epistomal suture; fg—frontal ganglion; fr—frons; hs—hypostomal suture; hypm—hypopharyngeal muscles; hyps—hypopharyngeal sclerites; hypx—hypopharynx; lab—labium; lahypb—labio-hypopharyngeal body; lalbr—lateral area of labrum; lbr—labrum; lbrc—labral compressors; lbrm—labral muscles; mdm—mandibular muscles; mo—mouth opening; mpm—medium pharyngeal muscles; pclyphrg—paraclypeal fold; pita—posterior intertormal bar articulation with tormae; pitb—posterior inter-tormal bar; pls—pleural suture; pmcls—pharyngeal muscles; pos—postoccipital suture; pta—posterior tentorial arm; ptp—posterior tentorial pit; rma—retractor of mouth angle; sas—subantennal suture; sdo—salivary duct opening; stom—stomodaeum; tor—tormae; torm—tormal muscle; w—lateral suspensorial sclerite of hypopharynx; x—suspensorial bar of hypopharynx; y—proximal branch of suspensorial bar of hypopharynx; y′—proximal end of suspensorial bar of hypopharynx; z—epipharyngeal arms of premandibular sternal plate of head.

LITERATURE CITED

Anthon, H. 1943. Der Kopfbau der Larven einiger Nematoceren Dipteren familien. Spol. Zool. Mus. Hauniensis Kobenhavn. 3: 1–61, 11 pls.

Butt, F. H. 1957. The role of the premandibular or intercalary segment in head segmentation of insects and other arthropods. Trans. Amer. Ent. Soc. 83: 1–30, 78 figs.

Cook, E. F. 1944a. The morphology of the larval heads of certain Culicidae. Microent. 9: 38–68, 17 figs.

——— 1944b. On the morphology of the larval head of a species of *Chironomus* (Diptera: Chironomidae). Microent. 9: 69–77, 4 pls.

Crampton, G. C. 1921. The sclerites of the head and the mouthparts of certain immature and adult insects. Ann. Ent. Soc. Amer. 14: 65–110, 86 figs.

DuPorte, E. M. 1957. The comparative morphology of the insect head. Ann. Rev. Ent. 2: 55–70, 7 figs.

Farnsworth, M. 1947. The morphology and musculature of the larval head of *Anopheles quadrimaculatus* Say. Ann. Ent. Soc. Amer. 40: 137–151, 3 pls.

Goetghebuer, M. 1912. Études sur les Chironomides de Belgique. Mem. des Sciences de l'Acad. Roy. Belg. III, pp. 1–26, 5 pls.

——— 1925. Contribution a l'etude de Praemandibules chez les larves des Dipteres nemoceres. Encyclop. Entomol. Diptera I, v. 3, pp. 143–157.

Gouin, F. 1957. Études sur l'Anatomie de la téte Larvaire de quelques Chironomidae (Dipt. Nematoc.). I. Les structures Chironomines. Ann. Ent. Soc. France. 126: 105–138, 15 figs.

Hennig, W. 1948. Die Larvenformen der Dipteren, 1 Tiel, 2 Tiel. Akademie-Verlag. Berlin.

Heymons, R. 1895. Die Embryonalentwickelung von Dermapteran und Orthopteren unter besonderer Berucksichtigung der Keimblatterbildung. Gustav Fischer, Jena, 136 pp.

——— 1899. Ueber blaschenformige Organe bei den Gespenstheuschrecken. Sitzb. d. kgl. preuss. Akad. d. Wiss., Berlin, 1899: 563–575.

Hirschler, J. 1924. Embryogenese der Insekten. In Schroder's "Handbuch der Entomologie." Chapt. 10, pp. 570–824 (1924). Gustav Gischer, Jena. 1928.

Kelsey, L. P. 1954. The skeleto-motor mechanism of the dobson fly, *Corydalus cornutus.* P.I. The head and prothorax. Cornell Univ. Agr. Exp. Sta. Memoir 334, 51 pp., 70 figs.

Kleinenberg, N. 1886. Die Enstehung des Annelids aus der Larve von Lopadorhynchus. Nebst Bemerkungen uber die Entwicklung anderer Polychaeten. Zeit. f. wiss. Zool. 44: 1–227, 16 pls.

Menees, J. H. 1958. The maxilla and labium of the larva of *Anopheles quadrimaculatus* Say. Bul. Brooklyn Ent. Soc. 53: 25–38.

Riley, W. A. 1904. The embryological development of the skeleton of the head of *Blatta.* Amer. Naturalist. 38: 777–810.

Roonwal, M. L. 1937. Studies on the embryology of the African migratory locust, *Locusta migratoria migratorioides.* I. The early development with a new theory of multiphased gastrulation among insects. II. Organogeny. Phil. Trans. Roy. Ent. Soc. London, Ser. B. 227: 175–244.

Sedgwick, A. 1894. On the law of development commonly known as Von Baer's Law; and on the significance of ancestral rudiments in embryonic development. Quart. J. Micr. Sci. 41: 35–52.

Shalaby, A. 1956. On the mouthparts of the larval instars of *Anopheles quadrimaculatus* Say. Bul. Soc. Ent. Egypt 40: 137–174, 37 figs.

Snodgrass, R. E. 1928. Morphology and evolution of the insect head and its appendages. Smithson. Misc. Coll. 81(3): 1–158, 57 figs.

——— 1935. Principles of insect morphology. McGraw-Hill Book Co., New York, 667 pp.

——— 1947. The insect cranium and the epicranial suture. Smithson. Misc. Coll. 107: 1–52, 15 figs.

——— 1951. Comparative studies on the head of mandibulate arthropods. Comstock Publishing Co., Ithaca, N. Y., 118 pp.

Thompson, D. W. 1942. Growth and form. Macmillan Co., New York, 1116 pp.

Tiegs, O. W. 1940. The embryology and affinities of the Symphyla based on a study of *Hanseniella agilis.* Quart. J. Micr. Sci. 82: 1–225, 41 figs.

——— 1947. The development and affinities of the Pauropoda, based on a study of *Pauropus silvaticus.* Quart. J. Micr. Sci. 88: 165–267, 275–336, 1 pls.

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OF THE

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OF THE

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Vol. LIV FEBRUARY, 1959 No. 1

A NEW FAMILY FOR THE DIPLOPOD GENUS FLORIDOBOLUS (SPIROBOLIDA, SPIROBOLIDEA)

By William T. Keeton[1]

The description by Causey (1957) of *Floridobolus,* a new genus of the order Spirobolida, makes one of the most important additions in recent years to the list of Diplopoda in North America. Through the kindness of Dr. Causey, I have been able to examine a male paratype of the generotype species *Floridobolus penneri.* Dr. Thomas Eisner of Cornell University has given me a small series of topotypes of the same species.

The unusual features of this genus first came to my attention in the course of work on a comprehensive revision of the family Spirobolidae. It is now apparent that *Floridobolus* cannot be assigned to the Spirobolidae, nor can it be placed in any of the other existing families of Spirobolida. Accordingly, a new family is here established and notes concerning *Floridobolus penneri* are presented. Particular attention is given to several fundamentally important characters not mentioned in the original description.

Floridobolidae, new family

Diagnosis: Distinguished from families of the Trigoniulidea (= Trigoniulidi, as defined by Brölemann, 1914, elaborating on the classification of Attems, 1909 and 1910) by the independent phallopods and the essentially linear arrangement of the telopodite, coxa, and coxal apodeme of each phallopod. Distinguished from all other families of the Spirobolidea except the Spirobolidae by the presence of well-developed coxae of the phallopods in addition to the universally occurring coxal apodemes. Differs from the Spirobolidae in the presence of a basal sclerite in the membrane between the gonopods, in the absence of true telopodites of the

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[1] Department of Entomology, Cornell University, Ithaca, N. Y.

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coleopods, and in the orientation of the coxae of the phallopods which run back through the body cavity to the vicinity of the tenth segment.

Floridobolus penneri Causey

Floridobolus penneri Causey, 1957, Proc. Biol. Soc. Washington 70: 206. (Male holotype and male paratype from "ten miles west of the Archbold Biological Station, U. S. Highway 70, Lake Placid, Highlands Co., Florida." Both specimens currently in the personal collection of Nell B. Causey, Fayetteville, Arkansas; Causey says "The holotype will be deposited in the American Museum of Natural History. . . .")

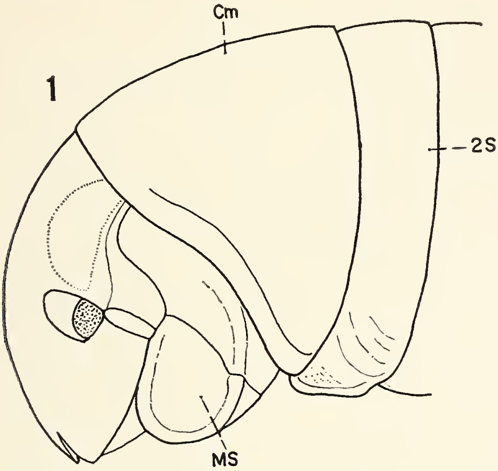
This is an unusually stout-bodied species in which the ratio L/W of adult specimens examined varies from about 6.1 to 7.9, the averages being 6.3 for females and 7.7 for males (it should be emphasized that these figures are based on very few specimens and will doubtless be modified as a result of future collecting). Lengths of adults examined range from 74 mm. to 92 mm.; widths from 10.8 mm. to 11.6 mm. Immatures of lengths 24 mm. to 53 mm. show approximately the same L/W ratios as do the adults. The body proportions, together with the exceedingly short legs which are hardly visible when the animal is walking, make *F. penneri* easily distinguishable at a glance from all other spiroboloid millipeds of eastern North America except *Narceus gordanus* Chamberlin.

Segment counts for adults vary from 47 to 50. Surprisingly, four obviously immature specimens examined (including one only 24 mm. long) have 48 segments. This would seem to indicate that individuals of *F. penneri* early attain the full number of segments and that later molts must be primarily concerned with increase in

EXPLANATION OF PLATE I

Floridobolus penneri Causey. Fig. 1. Head and first two segments, lateral view. Fig. 2. Coxa and second segment of right third leg of female, cephalic view. Fig. 3. Coxa and second segment of right fourth leg of female, cephalic view. Fig. 4. Left sixth leg of male, caudal view. Fig. 5. Distal portion of gnathochilarium (drawing by Frances A. McKittrick). Fig. 6. Second segment of female, cephalic view. Fig. 7. Cyphopod, caudal view. Fig. 8. Cyphopod, cephalic view. Fig. 9. Cyphopod, lateral view. Abbreviations: BV—basal valve, Cm—collum or first segment, DL—distal lobe, LS—lateral suture, MS—mandibular stipes, 2S—second segment.

KEETON PLATE I



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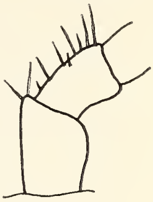

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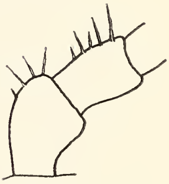

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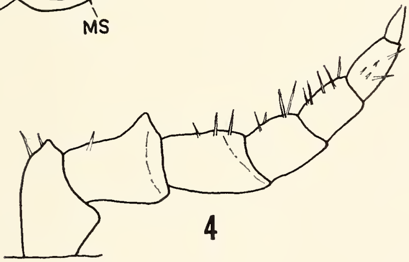

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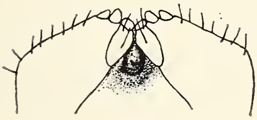

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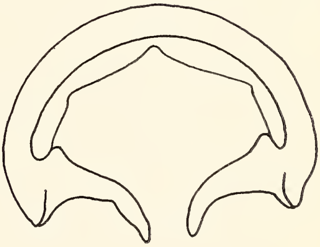

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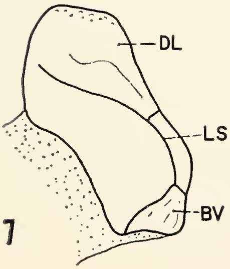

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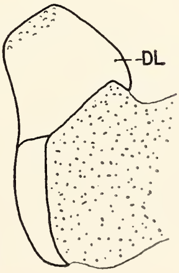

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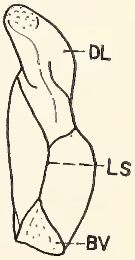

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size and with sexual maturation. This is different from the condition seen in all known species of Spirobolidae. Further observations on the life cycle of *F. penneri* would be of much interest.

Seven specimens show the following clypeal setae counts: 5 + 4, 5 + 5, 5 + 5, 5 + 5, 5 + 6, 5 + 6, 6 + 4. Five specimens show the following labral setae counts: 10 + 8, 10 + 10, 12 + 12, 12 + 12, 14 + 13. Three adults show the following eye counts: 52 + 57, 57 + 61, 59 + 60. In all three the eyes are arranged in nine rows in each patch. Immature specimens have fewer eyes and fewer rows.

The antennae are very stout and short; the second article is the longest but it only slightly surpasses the lateral margin of the clypeus. The mandibular stipes (Fig. 1, Ms) is rounded with a decidedly concave surface.

The mentum of the gnathochilarium (Fig. 5) provides a key character that will work for both sexes. The apex of the mentum is swollen to form a large raised convexity between the lingual lamellae. Four specimens show the following stipital setae counts: 6 + 6, 7 + 7, 7 + 8, 8 + 7. All specimens have two setae on each lingual lamella.

The lateral ends of the collum (Fig. 1, Cm) are narrow, though not sharp. The anterior margin is somewhat excavate on each side below the level of the eyes, and the anterior margining ridges are very pronounced. The ventrolateral portions of the second segment form short longitudinal carinae running almost the length of the segment, unlike the more knob-like and anteriorly located projections present in many Spirobolidae such as *Narceus.* The mesal ends of the ventral portions of the second segment in females (Fig. 6) are bent noticeably ventrad; this condition is much less pronounced in immatures.

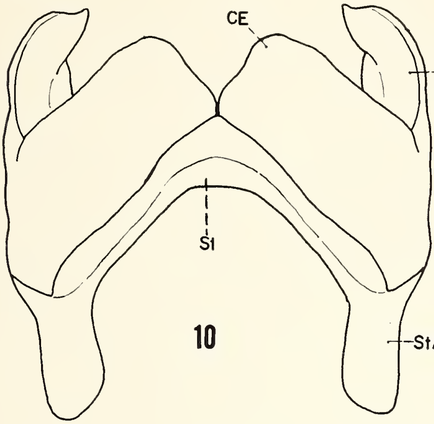
Causey has described and illustrated the uncinate lobes of the third coxae in males. The fourth coxae are slightly produced

EXPLANATION OF PLATE II

Figs. 10–12, 14–16, *Floridobolus penneri* Causey. Fig. 10. Coleopods, cephalic view. Fig. 11. Right coleopod, ventrocephalolateral view. Fig. 12. Coleopods (right portion) and basal sclerite, caudal view. Fig. 13. *Narceus,* coleopods, right portion, caudal view. Fig. 14. Left phallopod, mesal view. Fig. 15. Left phallopod, distal portion, lateral view. Fig. 16. Left phallopod, distal portion, caudal view. Abbreviations: BS—basal sclerite, C—coxa, CA—coxal apodeme, CE—coxal endite, PCB—posterior coxal bar, St—sternum, StA—sternal apodeme, T—telopodite.

KEETON

PLATE II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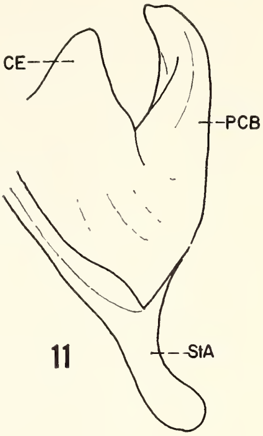

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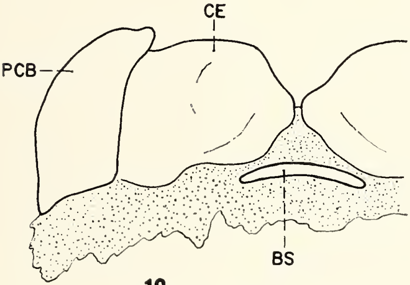

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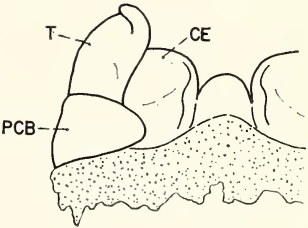

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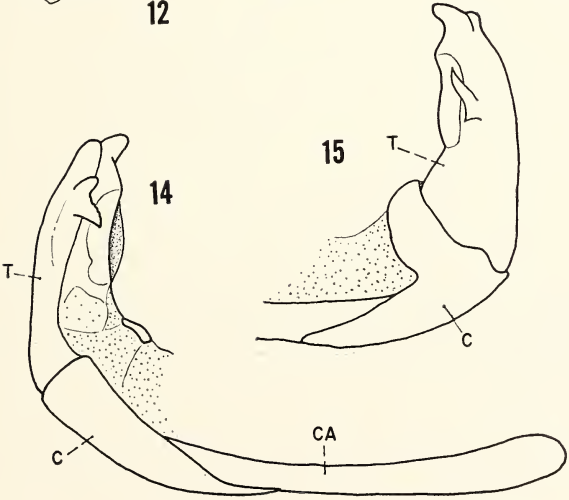

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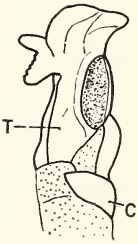

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ventrad. Other pregenital coxae (Fig. 4) show only an indistinct knob-like trace of production. The second segments of both pregenital and postgenital legs of males have distal swellings on their ventral surfaces (Fig. 4). All legs are heavily setose in both sexes. Third coxae of females (Fig. 2) are narrower ventrally than other coxae (Fig. 3).

The tergum of the telson is broadly rounded caudally, leaving a portion of the anal valves exposed to dorsal view. The anal valves have evenly convex surfaces with no trace of marginal anal lips.

The gonopods of the male exhibit several unusual features and it is primarily these characters that necessitate the erection of the new family Floridobolidae. The sternum of the coleopods (Fig. 10) is narrow and resembles that seen in Spirobolidae as opposed to those in such families as Rhinocricidae and Spirobolellidae. The coxal endites are broad and in contact for a short distance mesally. The unusual feature of the coleopods is the absence of telopodites. The caudomesally directed structures which Causey called telopodites are apparently actually homologous to the posterior coxal bars of the Spirobolidae. There are no sutures separating these structures from the coxae (although some are shown in Causey's drawing) and there are no telopodite muscles. Short grooves between the coxal endites and the posterior coxal bars (Fig. 11, CE and PCB) end abruptly and cannot be considered sutures between podomeres. Thus, when the coleopods are viewed caudally (Fig. 12), only one caudal structure is present on each side, unlike the two structures seen in Spirobolidae (Fig. 13).

A character of basic importance is the presence of a well sclerotized, narrow, transversely elongate "basal sclerite" (Fig. 12) (following the terminology of Brölemann, 1914) in the membrane between the coleopods and the phallopods. No such structure is present in any of the Spirobolidae.

The unusual features of the telopodite of the phallopod have been described by Causey. The structure (Figs. 14–16) shows several distal lobes, a very thin, acuminate lateral process which is tightly appressed to the body of the telopodite, and a large membranous area on the caudal surface. It is the coxal portion of the phallopod that is of major interest here. The coxal segment is well-developed in a manner similar to that in the Spirobolidae and unlike that in families such as the Rhinocricidae and Spirobolellidae where only the coxal apodeme remains. But the coxa and long, spatulate coxal apodeme are not oriented in an essentially vertical position within the cavity of the seventh segment; instead, they curve caudad from the base of the telopodite and run back through the body cavity to the region of the tenth segment. A belt-like portion of the coxa runs from the distolateral coxal surface around the caudal base of the telopodite.

The female cyphopods (Figs. 7–9) are simple, slightly elongate structures. A lateral suture, which runs ventrad from the area of the basal valve, branches about midway of the length of the cyphopod. The posterior branch runs ventromesad across the caudal plate; the anterior branch runs mesad a short distance to reach the membranous area at the base of the distal lobe of the cephalic plate. The surface of the extreme distal portion of the cyphopod is very faintly papillate.

The topotypic specimens in my collection were taken by Thomas Eisner, Roger S. Payne, and Jozef Nowosielski, June 20–28, 1958. The locality was very sandy with sparse palmetto vegetation. The millipeds were found crawling on the sand at night; they were inactive during the day, usually resting under pieces of wood or on old fence posts. The collectors were unsure whether this species ever burrowed deep into the sand in a manner similar to that seen in *Narceus gordanus* Chamberlin, which was abundant in the same area. The latter species was never found on the surface during the day.

LITERATURE CITED

Attems, C. 1909. Myriopoda, in Sjöstedt, Wissenshaftliche Ergebnisse der Schwedischen zoologischen Expedition nach dem Kilimandjaro, dem Meru und den umgebenden Massaisteppen Deutsch-Ostafrikas 1905–1906, pp. 1–64, 163 figs.

——— 1910. Myriopoden von Madagaskar, den Comoren und den Inseln Ostafrikas, in Voeltzkow, Reise in Ostafrika in den Jahren 1903–1905, Band 3: 73–115, 40 textfigs., 43 figs.

Brölemann, H. W. 1914. Études sur les Spirobolides. Ann. Soc. Ent. France 83: 1–38, 9 figs.

Causey, Nell B. 1957. *Floridobolus,* a new milliped genus (Spirobolidae). Proc. Biol. Soc. Washington 70: 205–207, 3 figs.

DISTRIBUTIONAL AND ECOLOGICAL RECORDS FOR SOME AQUATIC AND SEMI-AQUATIC HETEROPTERA OF NEW JERSEY[1]

By H. C. Chapman

Species of semi-aquatic and a few aquatic Heteroptera occupy various habitats ranging from the surface of water of streams, lakes, and ponds to the damp shores of these bodies of water as well as other situations. Members of Gerridae and Hydrometridae usually occupy the former habitat and are more often seen and collected. Species of Hebridae are very small and those of Saldidae often secretive and flighty, and both are difficult to collect and are usually poorly represented in collections. It is necessary to employ a variety of collecting techniques in capturing members of these families; techniques vary with the species and the ecological habitat.

A list of species of the families Mesoveliidae, Hebridae, Hydrometridae, Gerridae, Veliidae, Saldidae, Ochteridae, and Gelastocoridae, which the writer collected in New Jersey from 1953 through 1958, is presented in tabular form with localities, dates, numbers of specimens collected, and ecological habitats. The numbers of specimens of any species may or may not indicate the abundance of the species, since in many instances the number of specimens is a reflection of the writer's interest in that particular group.

Species	Nos.	Localities	Months	Habitats
MESOVELIIDAE				
Mesovelia mulsanti White	102	Helmetta, New Brunswick, Tuckahoe	August, September	bog, stream, impoundment
Mesovelia cryptophila Hung.	15	Helmetta, Jamesburg, Tuckahoe	May, August, September, October	bog, lake, impoundment
HEBRIDAE				
Hebrus buenoi Drake & Harris	20	Andover, Cranbury, New Brunswick, Tuckahoe, Windsor	May, June, August, October	salt-marsh, impoundment, banks of pools, ponds, streams
Hebrus burmeisteri L. & S.	181	Andover, Helmetta, Jamesburg, Lyons,	May, June, September, October	bog, swamp, impoundment, banks of pools, lakes, streams,

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[1] Paper of the Journal Series, New Jersey Agricultural Experiment Station, Rutgers University of New Jersey, Department of Entomology.

Species	Nos.	Localities	Months	Habitats
		New Brunswick, Tuckahoe		ponds
Hebrus concinnus Uhler	12	Tuckahoe	May, July, September, October	impoundment
Hebrus tuckahoanus Drake & Chapman	20	Tuckahoe	May, June, September	impoundment
Merragata brunnea Drake	7	Jamesburg, New Brunswick, Oxford, Tuckahoe	April, May, September, October	impoundment, swamp, lake bank
Merragata hebroides White	1	Tuckahoe	May	impoundment
HYDROMETRIDAE				
Hydrometra marteni Kirk.	117	Helmetta, Jamesburg, New Brunswick, Tuckahoe	August, September, October	bog, lake, impoundment, stream
GERRIDAE				
Gerris argenticollis Parsh.	4	New Brunswick	May	pond, impoundment
Gerris buenoi Kirkaldy	4	New Brunswick	May	pond, stream, impoundment
Gerris canaliculatus Say	9	New Brunswick, Tuckahoe	May, September	canal, stream
Gerris comatus Drake & Hottes	42	Hampton, Jamesburg, New Brunswick	May, September	lake, pond, canal, stream, impoundment
Gerris conformis (Uhler)	32	Hampton, New Brunswick	May	stream
Gerris insperatus Drake & Hottes	24	New Brunswick, Tuckahoe	May	stream, pond, ditch
Gerris marginatus Say	68	New Brunswick	May	pond, lake, canal, ditch, stream, impoundment
Gerris remigis Say	15	Hampton, New Brunswick	May	stream
Metrobates hesperius Uhler	21	Lyons, New Brunswick	September, October	stream
Trepobates inermis Esaki	45	Cranbury, Hightstown, New Brunswick, Watchung	August, September, October	stream, lake
Trepobates pictus (H. & S.)	71	Jamesburg, Hightstown, Millington, New Brunswick	September, October	lake, stream

Species	Nos.	Localities	Months	Habitats
Trepobates subnitidus Esaki	99	Hightstown, Jamesburg, Lyons, Millhurst, New Brunswick, Tuckahoe, Watchung	May, June, July, August, September, October	lake, stream, impoundment, pond, salt-marsh stream
Rheumatobates rileyi Berg.	41	Jamesburg, Hightstown, Marlboro, Millington, New Brunswick, Tuckahoe	July, September, October	lake, stream, impoundment, salt-marsh stream
Rheumatobates tenuipes Mein.	14	Jamesburg, New Brunswick	September, October	lake
VELIIDAE				
Microvelia pulchella incerta (Kirby)	9	Cranbury, Millhurst, New Brunswick, Watchung	August, September, October	lake, pond, stream
Microvelia buenoi Drake	2	Andover	May	stream
Microvelia hinei Drake	8	Andover, Jamesburg, Millhurst, Oxford, Tuckahoe	April, May, September	lake, pond, swamp, impoundment
Microvelia albonotata Champ.	9	Cranbury, Helmetta, Jamesburg, Tuckahoe	June, August, September, October	bog, lake, impoundment
Microvelia americana (Uhler)	24	Colts Neck, Freehold, Hampton, Helmetta, Lyons, New Brunswick, Tuckahoe, Watchung	April, May, July, August, October	stream, bog
Microvelia fontinalis Bueno	52	Andover, Cranbury, Helmetta, Jamesburg, New Brunswick, Tuckahoe	May, June, August, September, October	bog, swamp, impoundment, salt-marsh
Rhagovelia obesa Uhler	143	Colts Neck, Freehold,	July, August,	stream

Species	Nos.	Localities	Months	Habitats
		Helmetta, Jamesburg, Lyons, Marlboro, New Brunswick, Watchung	September, October	
Velia stagnalis Bueno	30	Manahawkin, Millhurst, New Brunswick, Tuckahoe	May, July, September	impoundment, lake, pond, stream
SALDIDAE				
Micracanthia floridana Drake & Chapman	33	New Brunswick, Tuckahoe	September, October	stumps in lake, logs in stream, cement abutment in stream
Micracanthia humilis (Say)	21	Colts Neck, Freehold, Helmetta, Hightstown, New Brunswick, Tuckahoe, Watchung	June, July, August, September, October	impoundment, bank of stream, and pond, swamp, stones in stream
Micracanthia hungerfordi (Hodgden)	40	Manahawkin, Tuckahoe	May, June, July, August, September	salt-marsh
Micracanthia husseyi Drake & Chapman	70	Helmetta, New Brunswick, Tuckahoe	June, September, October	bog, swamp, impoundment
Pentacora hirta (Say)	1	Manahawkin	July	salt-marsh
Pentacora ligata (Say)	6	Watchung	October	stones in stream
Pentacora sphacelata (Uhler)	4	Tuckahoe	May	quarry bank
Salda bouchervillei Prov.	6	Tuckahoe	May, June	impoundment
Saldoida slossoni Osborn	48	Helmetta, Tuckahoe	June, September, October	bog, impoundment
Saldula confluenta (Say)	5	Tuckahoe	May	stumps in lake
Saldula lugubris (Say)	20	Helmetta, New Brunswick, Tuckahoe	May, July, September	bog, swamp, impoundment
Saldula opacula (Zett.)	17	Helmetta, Watchung	September, October	bog, rocks in stream
Saldula orbiculata (Uhler)	12	Helmetta	September	bog
Saldula pallipes (Fabr.)	23	Helmetta, Hightstown, Lyons, New Brunswick,	May, August, September, October	bog, pond and stream bank, impoundment, rocks in stream,

Species	Nos.	Localities	Months	Habitats
		Tuckahoe, Watchung		salt-marsh
Saldula pallipes var. *dimidiata* (Curtis)	8	Hightstown, Marlboro, Tuckahoe	June, August, September	quarry and lake bank, impoundment
Saldula saltatoria (Linn.)	51	Cranbury, Freehold, Helmetta, Hightstown, New Brunswick, Windsor	May, July, August, September, October	bog, swamp, pond and stream bank (always in deep shade)
OCHTERIDAE				
Ochterus americanus (Uhler)	2	Manahawkin, Tuckahoe	July	impoundment, salt-marsh
GELASTOCORIDAE				
Gelastocoris oculatus Fabr.	1	Tuckahoe	May	impoundment

A total of 48 species and a variety were collected and identified. New state records include *Hebrus tuckahoanus, Micracanthia floridana, M. husseyi, M. hungerfordi,* and *Saldoida slossoni.*

Approximately 6 species have been reported from New Jersey that were not collected by the writer. In order to provide a complete list the following records are included: GERRIDAE—Kuitert (1942) reported *Gerris alacris* Hussey and *G. dissortis* Drake & Hottes; Drake and Harris (1934) cited *Gerris nebularis* Drake and Hottes; SALDIDAE—Drake and Hoberlandt (1950) reported *Saldula ablusa* Drake & Hottes; *Pentacora signoreti* (Guerin) was reported by Hungerford (1919); OCHTERIDAE—Schell (1943) cited *Ochterus banksi* Barber.

References

Drake, C. J. and H. M. Harris. 1934. The Gerrinae of the Western Hemisphere (Hemiptera). Ann. Carnegie Museum 23: 179–236.

Drake, C. J. and L. Hoberlandt. 1950. Catalogue of genera and species of Saldidae (Hemiptera). Acta Entomologica Musei Nationalis Pragae. 26(376): 1–12.

Hungerford, H. B. 1919. The biology and ecology of aquatic and semiaquatic Hemiptera. Kans. U. Science Bull. 11: 1–328.

Kuitert, L. C. 1942. Gerrinae of the University of Kansas collections. Kans. U. Science Bull. 28(7): 113–143.

Schell, D. V. 1943. The Ochteridae (Hemiptera) of the Western Hemisphere. J. Kans. Ent. Soc. 16: 29–46.

A NEW NORTH AMERICAN SPECIES OF TEPHRITIS, WITH SOME OBSERVATIONS ON ITS GENERIC POSITION (DIPTERA, TEPHRITIDAE)

By Richard H. Foote[1]

Recent revisionary studies of the fruit fly genus *Trupanea* Guettard and allies have brought to light a new species of *Tephritis* Latreille from the western United States closely related to *T. stigmatica* (Coq.). Malloch (1942) indicated that a Nevada specimen of this new species in the National Collection differed from *stigmatica* in several important respects, but he left it unnamed. Certain characters common to both of these species effectively bridge the discontinuity that heretofore existed between *Trupanea* and the genus *Tephritis* in North America. A discussion of this situation is presented below.

Tephritis labecula, n. sp.

(Fig. 2)

Trypanea stigmatica (Coq.), part: Malloch, 1942, Proc. U. S. National Museum 92 (3133) : 8, par. 2.

A western U. S. species with typical *Trupanea*-like wing pattern, a dark streak along vein $M_3 + Cu_1$ to its base, a dark spot at the base of vein Cu_2 + 2nd A, and a dark area of variable extent bridging the base of cell Cu_1.

Head.—Higher than long from lateral view; width of cheek directly below eye about one-sixth the eye height; apex of third antennal segment nearly attaining oral margin; width of frons at apex equal to distance from vertex to lunule and about 1.5 times as wide as one eye.

Thorax.—Mesonotum light gray pollinose, with a number of short, stout, yellowish hairs over the surface, remaining bristles black; humerus and notopleuron yellow pollinose; pleural sclerites gray dusted as mesonotum. Scutellum concolorous with mesonotum; with two pairs of black scutellars, the apical pair about one-half as long as the basal.

Legs.—Mostly yellow; all femora, except extreme bases and apices, gray pollinose; a trace of gray pollinosity on central portions of all tibiae. Male without erect anteroventral bristles on mid femur.

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[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture.

Wing (Fig. 2).—Preapical dark area similar to that of most other species in the genus, the posterior arm of the apical Y-shaped mark usually absent in male; marginal hyaline spot at apex of vein R_{2+3} about the same width as infuscated ray bordering it distally; dark ray connecting stigma to crossvein r–m distinctly wider than cell R_1 directly posterior to stigma but distinctly narrower than length of stigma, leaving base and tip of stigma hyaline; cell R broadly infuscated proximad of crossvein r–m, the infuscation of greater width anteriorly than posteriorly; hyaline spot immediately anterior to crossvein m–cu round and occupying only the lower half of cell R_5 at that point; distal infuscated ray through cell 1st M_2 complete to vein $M_3 + Cu_1$ and never extending beyond, sometimes broken in cell 1st M_2, in which case there is an infuscated spot on vein $M_3 + Cu_1$ indicating its presence there; proximal infuscated ray through cell 1st M_2 always ending at vein $M_3 + Cu_1$ posteriorly, but continuing broadly along that vein nearly to its junction with vein Cu_1, at which point it crosses the basal fourth of cell Cu_1 and surrounds the basal fourth of vein Cu_2 + 2nd A and often some of the apex of cell 1st A, this dark area sometimes broken in cell Cu_1 but always present. Remainder of wing hyaline.

Abdomen.—Pollinosity and short, stout bristles much as on mesothorax, but slightly darker. Ovipositor sheath black, its basal half to two-thirds densely covered with short, stout, yellowish-white bristles, about 1.5 times as long as preceding abdominal tergite.

Types.—*Holotype,* female, with the following labels: "Grand Co., Utah," "Collection No. 21, G. E. Wallace," and "Carnegie Mus. Acc. No. 11394." This specimen and the paratypes bearing the same labels were collected at Willis Steven's Camp above the junction of Florence and Pole Canyons, elev. 8500′; in the collection of the Carnegie Museum, Pittsburg; Carnegie Museum Type No. 384. *Paratypes.* NEVADA: 1 ♀, no other data (the Malloch specimen). UTAH: Grand Co., 4 ♂♂, Aug. 1–4, 1933 (G. E. Wallace)[2] Carnegie Mus. Acc. No. 11349 (1 ♂, U. S. Nat. Mus., 3 ♂♂, CM); 2 ♂♂, 2 ♀♀, same data as holotype (1 ♀, USNM; 2 ♂♂, 1 ♀, CM)[1]; 1 ♂, no definite locality, July, 1955 (G. F. Knowlton) (U. S. Nat. Mus.). WYOMING: 1 ♀, Buck Creek, Aug. 14, 1895; 1 ♂, Lance Creek, Aug. 14, 1895, one of the cotype series of *occidentalis* Adams (Foote, in press) (UK)[2].

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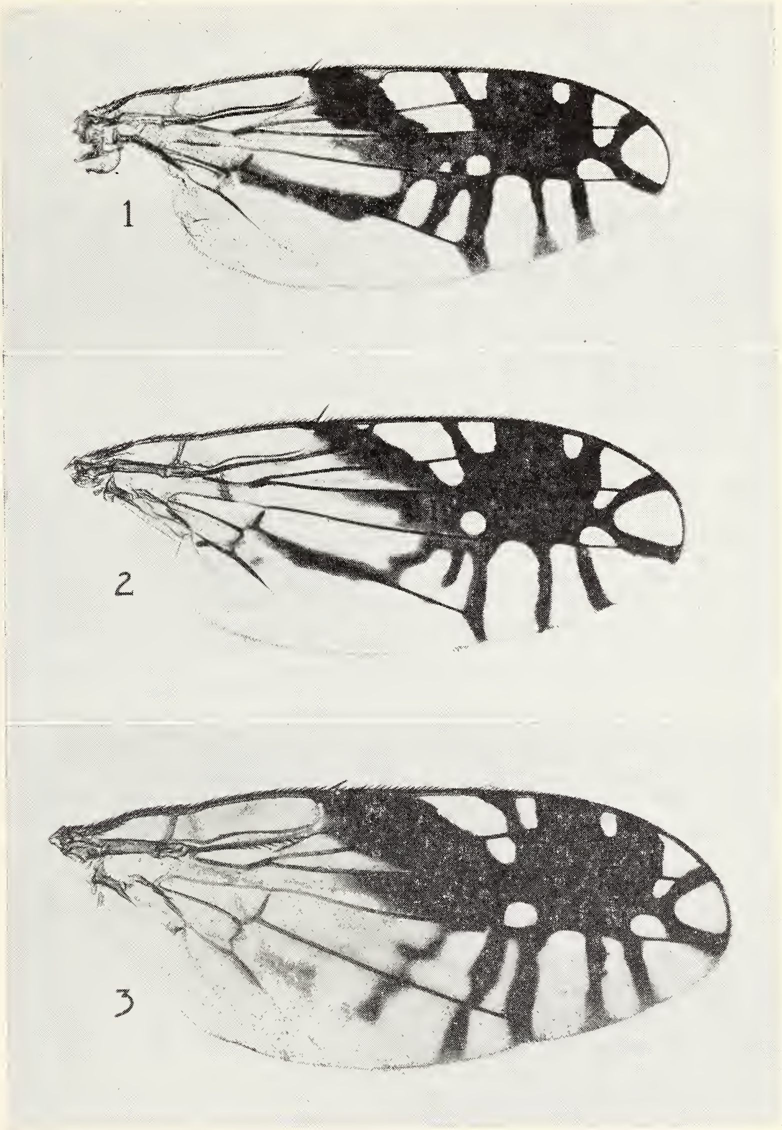
[2] I wish to thank Dr. G. E. Wallace for making the tephritid collection of the Carnegie Museum, (CM) available for study, and Dr. George W. Byers for lending specimens from the Snow Entomological Collection, University of Kansas (UK).

FOOTE



EXPLANATION OF PLATE

Fig. 1. *Trupanea femoralis* (Thoms.). Fig. 2. *Tephritis labecula,* n. sp. Fig. 3. *Tephritis stigmatica* (Coq.). All dorsal views of right wing, female.

Discussion.—The resemblance in wing pattern of *labecula* (Fig. 2) to that of *Trupanea femoralis* (Thoms.) (Fig. 1) is striking, but the two pairs of scutellars, together with the dark spot in the base of its cell Cu_1 and the rounded proximal tip of the hyaline area immediately distad of its stigma, will easily distinguish it from *femoralis.* In addition, wings of males of *labecula* are essentially like those of the female, whereas males of *femoralis* have wings with the dark, apical Y-shaped mark almost entirely missing. *T. labecula* can be separated easily from *T. stigmatica* (Coq.) (Fig. 3) by the lack of dark markings in the distal half of cell Cu_1 and their presence on the proximal half of vein $M_3 + Cu_1$, the narrower dark ray from stigma to crossvein r–m, the indication of an oval hyaline spot near the apex of cell R close to vein M_{1+2}, and the position of the marginal hyaline spot at the apex of vein R_{2+3} (compare Figs. 2 and 3). Wing patterns in both males and females of *stigmatica* are essentially alike.

Generic Relationships of labecula and stigmatica

The wing pattern of almost all *Trupanea* species (Fig. 1) consists characteristically of a starlike marking subapically upon the wing disc, a small marginal hyaline spot always present immediately below the apex of vein R_{2+3} in cell R_3, and the proximal posterior quarter of the wing with strongly reduced markings. A general resemblance to this subapical starlike mark is also found in wing patterns of *Tephritis,* but in most species of that genus the marginal hyaline spot is proximad of the tip of vein R_{2+3} in cell R_1, rather than as described above, and in most species the proximal posterior quarter of the wing is rather heavily marked with brown or gray (Quisenberry, 1951, Figs. 1, 2, 4–13). *T. labecula* (Fig. 2), with the least amount of basal infuscation, and *T. stigmatica* with somewhat more, effectively bridge the gap between the two genera, the former resembling *femoralis,* a true *Trupanea* having the most extensive basal wing markings of all North American species in that genus, and the latter resembling *Tephritis subpura* (Johns.).[3] However, Hendel (1927), Curran (1932) and Quisenberry (1951) have restricted *Tephritis* to those species with two pairs of scutellars; *labecula* and *stigmatica* would automatically fall within that concept in spite of their *Trupanea*-like wing pattern. I tend to agree with Quisenberry's belief that the wing pattern in this group has less than generic significance, and hence restrict *Trupanea* to those species with only one pair of scutellars, in contrast to Malloch's (1942) contention that the wing pattern features are of primary importance.

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[3] For an illustration of *T. subpura,* see Quisenberry, 1951, Fig. 6. a typical *Tephritis* with the least amount of dark marking in this area of the wing. On the basis of wing pattern alone, then, one might justifiably assume that no discontinuity between *Tephritis* and *Trupanea* really exists.

A possible solution might be the establishment of subgenera within the *Tephritis-Trupanea* concept. Benjamin (1943) made a beginning in this direction, but in my view did not study a large enough segment of the family. One such subgenus might logically include those species with a typical *Trupanea* wing pattern and a single pair of scutellars; into another would fall *labecula, stigmatica, subpura,* and possibly *pura* (Lw.), because of their *Trupanea*-like wings and two pairs of scutellars; in yet a third would be placed all those species with typical *Tephritis* wings and two pairs of scutellars. I regard such action at the present time to be hasty, since my preliminary observations indicate that certain species of the genera *Paroxyna* and *Euarestoides* may also intergrade with *Tephritis*. Furthermore, it is highly desirable that yet other genera in the family be evaluated in this light, and that consideration be made of the Neotropical fauna as well. Unfortunately, studies of other genera are not sufficiently detailed for the formulation of a master plan of generic and subgeneric groupings in what must be a very recently evolved segment of the family Tephritidae.

References

Benjamin, F. H. 1934. Descriptions of some native trypetid flies with notes on their habits. U. S. Dept. Agric. Tech. Bul. 401, 95 pp., illus.

Curran, C. H. 1932. New species of Trypaneidae, with key to the North American genera. Amer. Mus. Novitates No. 556, Sept. 12, 19 pp., illus.

Foote, R. H. in press. The genus *Trupanea* in America North of Mexico.

Hendel, F. 1927. Trypetidae. *In* Lindner, Der Fliegen der Palaearktischen Region, 49, pp. 1–221, text figs., 12 plates.

Malloch, J. R. 1942. Notes on two genera of American flies of the family Trypetidae. Proc. U. S. Nat. Mus. 92 (3133): 1–19, illus.

Quisenberry, B. F. 1951. A study of the genus *Tephritis* Latreille in the Nearctic Region north of Mexico. Jour. Kans. Ent. Soc. 24: 56–72, illus.

A NEW GENUS AND SPECIES OF PSENINI FROM THE SOUTHWESTERN DESERTS (HYMENOPTERA, SPHECIDAE)

By Karl V. Krombein[1]

The curious little psenine wasp described below first came to my attention in the extensive material collected by W. R. M. Mason in the Colorado and Mojave Deserts during the spring of 1955. I am indebted to Dr. Mason of the Division of Entomology, Ottawa, Canada, for the opportunity to study some of the material collected by him. It is a pleasure to name this distinctive new species for him in recognition of his exhaustive collecting.

Ammopsen Krombein, n. gen.

Ammopsen appears to be more closely related to *Psen* than to any of the other recognized genera of Psenini. The venation of the hind wing is like that of *Psen;* that is, the transverse median vein is received by the median vein distad of the cubital vein. However, it differs from *Psen* and the other described genera in several characters of rather critical importance such as the incomplete occipital carina, lack of transverse dorsal carina on pronotum, lack of anterior carina on prepectus, anomalous position of first recurrent vein in forewing (received by first submarginal cell), lack of lateral carinae on female pygidium, and sixth sternum of male with a transverse row of fasciculate hairs near apex.

Diagnosis. Very small, the only known species 3.7–4.2 mm. in length. Mandible of female simple, of male with a slight inner tooth near apex; labrum short, broad, apical margin rounded; clypeus not thickened apically, the margin broadly rounded; front tuberculate between antennae; frontal carina lacking; occiptal carina present dorsally only; female with several long, separated ammochaetae in a row along posterior margin of temple. Pronotum without a transverse dorsal carina; mesopleuron with prepectus rounded, not carinate anteriorly; propodeal enclosure not set off by marginal carinae; female with a comb on fore tarsus; posterior surface of hind femur with scattered short hairs; in forewing first recurrent vein received just proximad of first transverse cubital and second recurrent just distad of second transverse cubital, the second submarginal cell narrowed above, not receiving a recurrent vein; in the hind wing the transverse median vein received on median vein distad of cubital vein, the hamuli five in number, moderately separated from each other, the group located just beyond origin of radius. Petiole very short, about as long as hind coxa; pygidial area of female broad and almost flat, lateral carinae absent; sixth sternum of male with a transverse row of fasciculate hair near apex (treatment with KOH shows that this entire sclerite is densely covered with hairs which are longest across middle); seventh sternum of male with apex of median lobe truncate; eighth sternum of male terminating in a slender spine.

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[1] Entomology Research Division, Agricultural Research Service, U.S.D.A., Washington, D. C.

Type. *Ammopsen masoni* Krombein, new species.

Ammopsen masoni Krombein, n. sp.

The small size and the characters listed in the generic discussion will serve to distinguish this species from any other known Nearctic psenine wasp. In addition, the dense, appressed silvery pubescence on much of head and thorax and the delicately rugulose-reticulate propodeal enclosure are not found elsewhere in our psenine fauna.

Unfortunately, no data are available on the biology of this species, but the temporal ammochaetae and tarsal pecten in the female indicate that it nests in the sand.

Type. Male; Thousand Palms, Riverside County, California; April 16, 1955 (W. R. M. Mason) [Division of Entomology, Ottawa, Canada].

Length 3.7 mm., forewing including tegula 2.3 mm. Shining, black, the abdomen light red except petiole and dark brown blotches on middle of fourth and most of fifth terga; the following white to creamy—mandible except apex, antenna beneath, tegula, apex of pronotal tubercle, narrow stripes on tibiae externally, tibial spurs, and tarsi except last segment. Wings hyaline, veins mostly testaceous.

Head width 1.3 times the height, the vertex rounded above eyes; clypeus, face and upper temples with dense appressed silvery pubescence obscuring the sculpture; apical margin of clypeus practically truncate; small, low tubercle between antennal insertions; ocelli small, in an equilateral triangle, the postocellar distance 1.1 times the ocellocular distance; occipital carina present dorsally only; antenna short, the flagellum clavate, the third to tenth flagellar segments becoming progressively more produced at apex beneath, the fourth, fifth and last segments concave beneath.

Dorsum of pronotum, mesopleuron except anterior face, postscutellum, and dorsal and posterior faces of propodeum except enclosure with dense, appressed silvery pubescence; pronotum rounded dorsally, without transverse carina; scutum and scutellum with small punctures separated from each other by a little more than the width of a puncture; enclosure of propodeum a broad triangle covering most of dorsum, very finely rugulose-reticulate, not margined by carinae; lateral propodeal surface granulate; posterior propodeal surface with a deep, narrow median sulcus.

First five abdominal terga on apical halves, and sterna, with thin, appressed silvery hairs, much sparser than on head and parts of thorax; petiole very short, no longer than hind coxa, not sulcate or carinate; anterior face of first tergum perpendicular to petiole.

Male paratypes range in length from 3.7 to 4.0 mm. They differ very little from the type in sculpture or pubescence, but the abdominal coloration is rather variable: half of them are colored as in the type, but four have the fourth and following terga infuscated, and one lacks any red on the abdomen. The extremes in variation are found in the Thousand Palms population. One male has a petiolate second submarginal cell.

Allotype. Female; same data as type except April 12, 1955.

Length 4.2 mm.; forewing, including tegula, 2.9 mm. Colored as in male except tarsi entirely pale and abdomen entirely red; pubescence also as in male. Other characters as in male except as follows: antenna short and clavate, the flagellar segments not produced beneath at apex; propodeal enclosure with weak transverse rugulae except basally where they radiate from base; fore femur with a few scattered long setae behind; pygidial area rather broad, the sides converging posteriorly at a 60° angle, the surface with small punctures separated by a little less than the diameter of a puncture and bearing inconspicuous decumbent setae, lateral margins straight but not carinate.

The female paratypes range in length from 3.6 to 4.1 mm. and are like the allotype except in two of them the last two terga are slightly infuscated and in another two the normally black areas of the legs are replaced by reddish.

Paratypes. 8 ♂♂; Thousand Palms, Riverside County, California; April 7 (1 ♂), April 15 (4 ♂♂), April 16 (2 ♂♂), April 26 (1 ♂), all 1955 (W. R. M. Mason). 3 ♀♀; Box Canyon, Riverside County, California; April 27, 1952 (P. H. Timberlake; on *Eriogonum thomasii*). 2 ♀♀; Blythe, Riverside County, California; April 24, 1955 (W. R. M. Mason). 1 ♂; 4.7 miles east of Bonds Corner, Imperial County, California; April 14, 1949 (P. H. Timberlake). 1 ♀; Borego, San Diego County, California; April 2, 1953 (P. D. Hurd). 1 ♀; same locality, but April 25, 1954 (M. Wasbauer; on *Croton californicus*). 2 ♂♂, 1 ♀; Helendale, San Bernardino County, California; May 27, 1955 (W. R. M. Mason).

3 ♂♂; 5 miles east of Deming, Luna County, New Mexico; September 13, 1957 (P. H. Timberlake and R. C. Dickson; on *Euphorbia fendleri*). Paratypes are in the collections of the U. S. National Museum, Cornell University, Division of Entomology at Ottawa, Canada, Citrus Experiment Station at Riverside, California, and California Insect Survey at Berkeley.

NOTES ON THE BUPRESTIDAE

By G. H. Nelson[1]

This paper contains notes on some of the less common species of Buprestidae taken in Southern California during the past four years by the writer and others. Thanks are due Dr. R. L. Schultz, Messrs. D. S. Verity and R. L. Westcott for allowing the writer to include their captures in this paper and to Dr. John Roos who identified most of the plant material. Unless otherwise noted, the specimens were collected by the writer.

Polycesta crypta Barr, 1949, Amer. Mus. Nov. No. 1432: 32–34. Since no host data were available when this species was described, it seems worthy to note the capture of two female specimens. One was cut from *Arctostaphylos* sp. at Camp Angelus, San Bernardino Mts., Calif., May 2, 1958. The other was taken on *Ceanothus divaricata* at 4500 feet in the San Bernardino Mts., Calif., June 8, 1958.

Polycesta tularensis Chamberlin, 1938, Jour. N. Y. Ent. Soc. 46: 445.
Two females were taken by R. L. Schultz, one while beating *Fremontia californica* in the San Gabriel Mts., Calif., June 22, 1955, and the other emerged on June 13, 1958 from wood of *Fremontia* gathered in February of 1958. Since this species was formerly known only from northward extensions of the coast and inland mountain ranges, these records extend the known range of *tularensis* southward two hundred miles and fill the gap between the two mountain ranges.

Polycesta cazieri Barr, 1949, Amer. Mus. Nov. No. 1432: 36–39. Two males of this species were taken at Pine Valley, San Diego Co., Calif., July 10, 1958 where they were landing on the dead limbs of *Ceanothus perplexans*.

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[1] Department of Anatomy, College of Medical Evangelists, Loma Linda, California.

Acmaeodera pullata Cazier, 1940, Wasmann Collector 4 (2) : 57, 58.
Two males of this attractive species were taken by R. L. Schultz one mile east of Boulevard, San Diego Co., Calif., June 25, 1958 as they were flying to *Adenostoma fasciculatum.* The two specimens at hand have the marginal serrations of the elytra, although smaller anteriorly, extending from the apex to the basal fourth. This species was described from the San Jacinto Mts. of Riverside Co., Calif.

Acmaeodera sinuata Van Dyke, 1919, Ent. News 30: 152.
This species seemed uncommon, but occasional specimens were taken as follows: San Bernardino Mts., Calif., 5000 feet, June 15, 1958 on *Ceanothus crassifolius;* San Jacinto Mts., Calif., 4000 feet, July 14, 1958 on *Ceanothus* sp.; Pine Valley, San Diego Co., Calif., July 10, 1958 on *Ceanothus perplexans.*

Acmaeodera plagiaticauda Horn, 1878, Trans. Amer. Ent. Soc. 7: 10.
A fairly good series of this usually uncommon species was taken in the San Bernardino Mts. (4500–5000 feet) between May 24 and June 28, 1958 as they were flying about *Arctostaphylos* sp. One male was captured one mile east of Boulevard, San Diego Co., Calif., June 25, 1958 flying to manzanita.

Acmaeodera purshiae Fisher, 1926, Ent. News 37: 114–115.
A female caught at Jacumba, San Diego Co., Calif., June 25, 1958 represents the most southern record yet for this species. It was also taken at Desert Springs, San Bernardino Co., Calif., August 3, 1958. All were captured as they flew to *Purshia tridentata.*

Acmaeodera curtilata Knull, 1941, Ann. Ent. Soc. Amer. 34: 692.
This species was described by Prof. J. N. Knull from five specimens collected at Moronga Valley, Calif., May 28, 1941. The writer took a fine series of this species 5 miles northwest of Palm Springs, Calif. on *Dalea californica* from May 4 to June 22, 1958. The majority of the specimens were sitting on the foliage, but an occasional specimen was captured while flying to the shrub. These specimens have the pronotum constricted just before the base but again expanding slightly at the base. The coarse white pubescence is actually in the form of elongate flattened setae that project in various directions from the body surface and give the appearance that the beetle needs its "hair" combed. Other specimens were taken by R. L. Schultz, D. S. Verity and R. L. Westcott.

Acmaeodera dohrni Horn, 1878, Trans. Amer. Ent. Soc. 7: 15, 16.
During June this species was taken in the San Bernardino Mts.

(4500–5000 feet) on *Ceanothus crassifolius* and flying to *Adenostoma fasciculatum.* The spots on these specimens vary in color from the more typical pinkish orange to pale yellow.

Acmaeodera simulata Van Dyke, 1937, Bull. Brooklyn Ent. Soc. 32: 108.
Occasional specimens of this species were taken by R. L. Schultz and the writer in the San Bernardino Mts., Calif. (4500–5000 feet) from June 8 to 28, 1958. They were found flying about *Quercus wislizenii, Adenostoma fasciculatum* and *Arctostaphylos* sp.

Acmaeodera bivulnera Horn, 1894, Proc. Calif. Acad. Sci. 4: 371.
It seems noteworthy to mention the capture in Southern Calif. of large numbers of this usually uncommon species. D. S. Verity caught this species 2.5 miles south of Palm Desert, Riverside Co., Calif., July 6, 1958 on *Hymenoclea salsola.* Several visits to the area by R. L. Schultz and the writer revealed it to be common but local. Numerous specimens were taken on *Cercidium floridum* and on *Hymenoclea salsola* from July 8 to 22, 1958.

Acmaeodera guttifera Leconte, 1859, Proc. Acad. Nat. Sci. Phila. 11: 72.
This common species was collected on various plants in Southern Calif. including the following: *Quercus wislizenii, Q. dumosa, Ceanothus divaricata* and *Rhamnus californica.* A long series was taken at Pinyon Flat, Riverside Co., Calif., June 14, 1954 on the dead limbs of *Condalia parryi.*

Acmaeodera fattigi Knull, 1953, Ent. News 64: 144, 145.
Since no host data is available on this rare species, it seems worthwhile to record the capture of a single female on *Acacia greggii* at Jacumba, San Diego Co., Calif., July 26, 1957.

Hippomelas cuneata (Horn), 1868, Trans. Amer. Ent. Soc. 2: 133.
Usually considered uncommon, this species was found in numbers at Moronga Valley, San Bernardino Co., Calif., July 4, 1957 and 1958 on *Prosopis chilensis* and *Acacia greggii* by D. S. Verity and the writer.

Dicerca pectorosa Leconte, 1857, Rept. of Expl. and Surv. Miss. to Pac. 12: 45.
Since this species is not commonly taken, it seems appropriate to mention its capture in the San Bernardino Mts., Calif., 4500 feet, May 24, 1958 on the saplings of *Prunus virginica* var. *demissa.*

Chrysobothris edwardsii Horn, 1886, Trans. Amer. Ent. Soc. 13: 74.
Two pairs of this species were collected on *Cercidium floridum* at Painted Canyon, Riverside Co., Calif., June 23, 1958.

Chrysobothris carmelita Fall, 1907, Canad. Ent. 39: 236, 237. One female was caught 20 miles east of Yuma, Ariz., May 30, 1958 as it was running on the foliage of *Olneya tesota* which may be one of its hosts. Five more were caught on the same plant at Box Canyon, Riverside Co., Calif., June 7, 1958 by D. S. Verity and R. L. Westcott.

Chrysobothris parapiuta Knull, 1938, Ann. Ent. Soc. Amer. 31: 138.

A female specimen of this colorful little species, described from Wickenburg, Ariz., was caught at Pinyon Flat, Riverside Co., Calif., June 14, 1954 on *Condalia parryi.*

Chrysobothris atrifasciata Leconte, 1873, Acad. Nat. Sci. Phila. Proc. 25: 332.

Several specimens of this species were taken on *Atriplex lentiformis* by R. L. Schultz and the writer near Mecca, Riverside Co., Calif., June 23, 1958.

Chrysobothris santarosae Knull, 1947, Ohio Jour. Sci. 47: 70. This species was described from the Santa Rosa Mts., Riverside Co., Calif. Two males were taken from *Ephedra californica* near Jacumba, San Diego Co., Calif., July 10, 1958.

Chrysobothris atriplexae Fisher, 1942, U. S. Dept. Agric. Misc. Pub. 470: 45, 46.

One specimen was taken from Palm Springs, Calif., June 5, 1958 by D. G. Kissinger and three from 2.5 miles south of Palm Desert, Riverside Co., Calif., July 8, 1958, all on *Atriplex canescens.* Records by D. S. Verity for this species are: Palm Springs, Calif., May 7, 1958; 4.8 miles northwest of Cathedral City, Riverside Co., Calif., June 8, 1958 and Sulphur Springs, Inyo Co., Calif., June 22, 1958, all on *Atriplex* sp.

Glyptoscelomorpha viridis Chamberlin, 1931, Pan-Pac. Ent. 8: 47.

This uncommon beetle was taken at Desert Springs, San Bernardino Co., Calif., July 24, 1954 and at Mountain Springs, San Diego Co., Calif., June 25, 1958, all on *Juniperus californicus.*

Dystaxiella juniperae Knull, 1940, Ohio Jour. Sci. 40: 362.

This species was described from specimens collected at Mountain Springs, San Diego Co., Calif. The writer took it at the type locality, July 25, 1958 and at 3500 feet in the Santa Rosa Mts., Riverside Co., Calif., June 30, 1958.

A NEW TINGID FROM PAKISTAN (HEMIPTERA)

By Carl J. Drake* and J. Maldonado Capriles**

The present paper characterizes a new species of lace-bug from Lahore, Pakistan. This is the third species of the genus *Dictyonota* Curtis (1827) to be described from the Oriental Region. The other two are *D.* (*Dictyonota*) *mitoris* Drake and Hsiung (1936) from China and *D.* (*Alcletha*) *pussana* Drake and Maa (1955) from India.

Dictyonota pakistana, n. sp.
(Fig. 1)

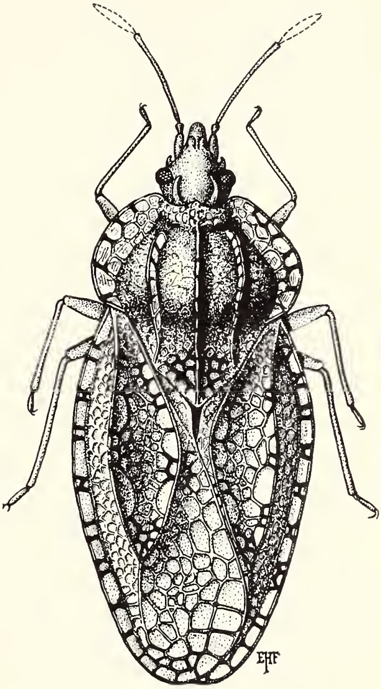

Fig. 1. *Dictyonota pakistana,* n. sp. × 40.

Moderately large obovate, testaceous with disc of pronotum brownish, head brownish fuscous, and many veinlets on dorsal surface blackish fuscous; body beneath dark brown; legs dark brown with femora slightly infuscate. Antennae dark brown. Labium dark brown with terminal segment blackish; laminae and bucculae pale testaceous. Length 3.50 mm., width 1.00 mm.

Head fairly long, extending about three times the length of an eye in front of eyes, distinctly pitted, armed with two pairs of spines; anterior pair very stout, short, blunt; hind pair moderately stout, decumbent, not quite reaching to anterior margins of eyes. Labium extending slightly beyond first two ventral tergites; laminae parallel, foliaceous, open behind, composed of one row of large areolae. Bucculae long, not quite reaching to apex of head, parallel, open in front, tapering anteriorly, three cells

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* Smithsonian Institution, Washington, D. C.

** University of Puerto Rico, Mayagues, P. R.

deep behind, open in front. Antennae slender, shortly pubescent, fairly slender—measurements: segment I, 5; II, 8; III, 54; IV missing. Metapleural orifice indistinct. Hypocostal laminae rather narrow, uniseriate.

Pronotum moderately convex, punctate, tricarinate; median carina long, moderately elevated, composed of one row of fairly large, subquadrate areolae; lateral carinae as strongly elevated as median, also uniseriate, divergent anteriorly from middle of disc, terminating in front at calli; collar distinct, biseriate; hood small, elevated at middle so as to form a tiny crest; paranota long, moderately wide, mostly biseriate, triseriate opposite calli, with cells fairly large; triangular process obtusely angulate at apex. Elytra widest near middle, a little longer than abdomen, with apices overlapping in repose; costal area moderately wide, uniseriate, with transverse veinlets black-fuscous, arranged mostly in pairs; subcostal area fairly wide, sloping obliquely downward, composed of three, irregular rows of areolae; discoidal area elongate, two-thirds as long as elytra, with sides raised, longitudinally depressed along the middle, four to five areolae deep in widest part, the areolae about same size as in sutural area.

Holotype male, *allotype* female and *paratype* female, all taken in a light trap, Lahore, West Pakistan, July–August, 1957 (J. Maldonado Capriles); in Drake Collection (U. S. Natl. Mus.). The drawing was made from the paratype specimen by Mrs. Richard Froeschner.

Allied to *D.* (*Dictyonota*) *mitoris* Drake & Hsiung, but readily separated from it by the thinner and shortly pubescent antennae, more elevated pronotal carinae and irregularly triseriate subcostal area. The rostrum is also a little shorter. *D.* (*Alcletha*) *pussana* Drake & Maa belongs to a different subgenus. The antennae of the latter are distinctly shorter, much thicker and longly hairy.

PUBLICATIONS RECEIVED

Insects and Mites of Western North America, by E. O. Essig. xi + 1050 pp., 766 text figs., 6 x 9 ins., clothbound, **revised.** 1958. The Macmillan Company. A manual and textbook for students in colleges and universities and a handbook for county, state and federal entomologists and agriculturists as well as for foresters, farmers, gardeners, travelers, and students of nature. (Price, $18.00).

Bibionid Larvae in the Stomach of a Deer.—In November, 1946, several larvae of *Bibio* species, found in large numbers in the stomach of a dead doe on Mt. Desert Island, Maine, were brought into the entomological laboratory for identification. The larvae were apparently full-grown, and still in a good state of preservation, the integument complete but the internal organs more or less disintegrated. Since larvae of this dipterous family are scavengers in soil, frequently occurring in dense clusters of many individuals in sod or leaf mold, it was presumed that their presence in an animal stomach most certainly was not indicative of a parasitic relationship and in all probability had no connection with the death of the host, but was a result of accidental ingestion of a cluster of larvae along with roots of low-growing vegetation.—MARION E. SMITH, Amherst, Mass.

Mantispidae were fairly common in Logan Green Canyon, Utah, on a very few of the many blossoming *Chrysothamnus nauseosus* rabbit brush bushes in one small area on September 11 and 14, 1957. A few of the fifteen specimens taken were sent to Sophy Parfan. She identified all of the variable-sized specimens as *Climaciella brunnea* var. *occidentis* Banks. Occasionally over the years I have found a number of these locally in Utah localities, on blossoming goldenrod or on rabbit brush.—GEORGE F. KNOWLTON, Logan, Utah.

EXCHANGES AND FOR SALE.

This page is limited to exchange notices and to small For Sale advertisements from members of the Society and from actual paid subscribers to the Bulletin exclusively. *Exchange notices* from members of the Society and from subscribers are limited to *three (3) lines each,* including address; beyond 3 lines, there will be a charge of $1.00 for each 3 lines or less additional. *For Sale* ads will be charged at $1.25 for each 3 lines or part of 3 lines. *Commercial or business* advertisements will not be carried in this page, but will go in our regular advertising pages at our regular advertising rates to *everybody.*

CERAMBYCIDAE AND CHRYSOMELIDAE from Asia and Pacific desired for determination; purchase; exchange.—J. Linsley Gressitt, Pacific Science Board, Bishop Museum, Honolulu, T.H.

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FOR SALE—Copies of the majority of the back issues of both Entomologica Americana and the Bulletin are available and for sale as individual items. Want lists will receive prompt attention. —EDITOR.

WANTED—Larvae of *Anthrenus scrophulariae* preserved in alcohol.—George S. Tulloch.

WANTED—American Haliplidae (particularly *Peltodytes*) on loan for identification or for exchange; also *Hydrocanthus* (Noteridae). Will identify without charge general aquatic Coleoptera from pollution surveys if accompanied by ecological and locality data.—Frank N. Young, Zoology, Indiana University, Bloomington.

FOR EXCHANGE—Reprints on water beetles and A. C. Kinsey's "Gall Wasp Genus Cynips" and "Origin of Higher Categories in Cynips" for reprints on aquatic insects.—Frank N. Young, Zoology, Indiana University, Bloomington.

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Entomologica Americana, Vols. 1–6 (1885–1890) and 7–10 (1926–30), positive microfilm	$12.00
Vols. 11–37, 1926–1957, complete, regular issue, paper cover	$200.00
A Glossary of Entomology, Torre-Bueno, cloth bound. Domestic postpaid, foreign 25 cents extra	$ 5.00

Monographs from Entomologica Americana

Studies on the Pleuropodia of Belostoma flumineum and Ranatra fusca, Hussey. 81 pp., 74 figs. 1926	$ 1.00
The Family Hydrometridae in the Western Hemisphere, Torre-Bueno. 46 pp. 1926	$ 1.00
A Contribution to the Knowledge of the Life History of Bremus bimaculatus, Frison. 65 pp., 8 figs. 1928	$ 1.00
A Revision of the Genus Eurema—Part II. New World Species, Taxonomy and Synonymy, Klots. 73 pp., 101 figs. 1929	$ 1.00
Synopsis of the Principal Larval Forms of the Coleoptera, Boving & Craighead. cloth bound, 351 pp., 125 plates. 1930–31.	$10.00
The Nearctic Social Wasps of the Subfamily Polybiinae, Bequaert. 63 pp., 8 figs. 1933	$ 1.00
Revision of the Epistrophe Flies of America North of Mexico, Fluke. 57 pp., 45 figs. 1935	$ 1.00
The Biology and Taxonomy of the Genus Trichiotinus, Hoffmann. 76 pp., 20 figs. 1935	$ 1.00
A Review of the Genus Cyrtopogon in North America, Wilcox and Martin. 95 pp., 58 figs. 1936	$ 1.00
Bibliography of the Described Life Histories of the Rhopalocera of America North of Mexico, Davenport and Dethier. 40 pp. 1937	$ 2.50

Monographs from Entomologica Americana

The American Patrobini, Darlington. 48 pp. 1938	$ 1.00
A Synopsis of the Hemiptera-Heteroptera of America North of Mexico—Part II. Coreidae, Alydidae, Corizidae, Neididae, Pyrrhocoridae and Thaumastotheriidae, Torre-Bueno. 81 pp. 1941	$ 3.00
A Monograph of the Genus Chyphotes of North America, Buzicky. 40 pp., 13 figs. 1941	$ 1.50
A Monograph of the Melophaginae, or Ked-Flies of Sheep, Goats, Deer and Antelope, Bequaert. cloth bound, 210 pp., 18 figs. 1942.	$ 5.00
Selection of Colored Lights by Night-Flying Insects, Milne and Milne. 65 pp. 1944	$ 1.50
A Revision of the North American Species of the Genus Carabus, Van Dyke. 50 pp., 24 figs. 1944	$ 1.50
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The Larvae of the Harpalinae Unisetosae, Chu. 71 pp., 92 figs. 1945	$ 1.00
Notes and Keys on the Genus Brochymena, Ruckes. 95 pp., 41 figs. 1946	$ 2.00
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The Tingoidea of New England and their Biology, Bailey, 140 pp., 6 figs. 1951.	$ 5.00
The Hippoboscidae or Louse-Flies of Mammals and Birds, Part I. Structure, Physiology and Natural History, Bequaert, 442 pp., 21 figs., 1952–53.	$10.00
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BULLETIN

OF THE

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Vol. LIV APRIL, 1959 No. 2

CONCERNING THE GENUS *METROBATOPSIS* ESAKI WITH DESCRIPTION OF A NEW SPECIES (HETEROPTERA; GERRIDAE)[1]

By Herbert B. Hungerford and Ryuichi Matsuda

The genus *Metrobatopsis* was described by the late Dr. Teiso Esaki in Annales Musei Nationalis Hungarici, 23, pp. 144–145 (1926) to receive his two new species, *M. flavonotatus* and *M. affinis,* both from the same place in New Guinea. In our review of this genus we give additional notes and drawings of the above mentioned species and describe a new species from the Solomon Islands where *M. flavonotatus* Esaki is also found.

Genus *Metrobatopsis* Esaki, 1926

Head between eyes only feebly widened posteriorly. First antennal segment longest in both sexes, greatly thickened in male of one species; third segment shortest. Eyes without indentation, covering almost entire lateral margin of pronotum. Pronotum relatively short, posterior margin broadly rounded. Metasternum without omphalium. Front femur thickened basally; first front tarsal segment greatly reduced. Middle leg with femur thick, shorter than tibia. Hind leg shorter than middle leg; femur much longer than tibia. Anterior margin of first tergite obliterated medially.

Male. Seventh abdominal segment greatly prolonged. Eighth segment varies greatly in degree of prolongation in different species. Ninth segment with pygophore vertically rotated and with a process on median longitudinal axis in two species. Suranal plate

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[1] Contribution No. 1034 from the Department of Entomology, University of Kansas. This report is a by-product of a project conducted with the aid of a grant from the National Science Foundation.

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with an elongate process on each lateral margin near apex.

Female. Seventh ventrite greatly developed.

Winged forms. Hemelytra with a pale line of weakness in membranous area.

Comparative notes. The genus *Metrobatopsis* differs from *Rheumatometra* in having the head narrower between eyes, especially in male, in the absence of median longitudinal impression on mesonotum in female, and in the male front femur being not so greatly arched, etc.

Metrobatopsis affinis Esaki
(Pl. I, A. Pl. II, figs. 1, 2)

Metrobatopsis affinis Esaki, Ann. Mus. Nat. Hung. 23: 146–148 (1926).

This species was described from a single carded specimen which we have remounted on a point in order to see the apical abdominal segments. The ventral side of the eighth and ninth segment carry the striking specific character of the species which was not mentioned in the original description (Pl. II, fig. 1). The genitalia were not dissected. The pygophore (ninth segment) does not have finger like process and the suranal plate was not lifted for examination. Since the original description is short and mostly a comparison with *M. flavonotatus* we offer the following notes on this type specimen.

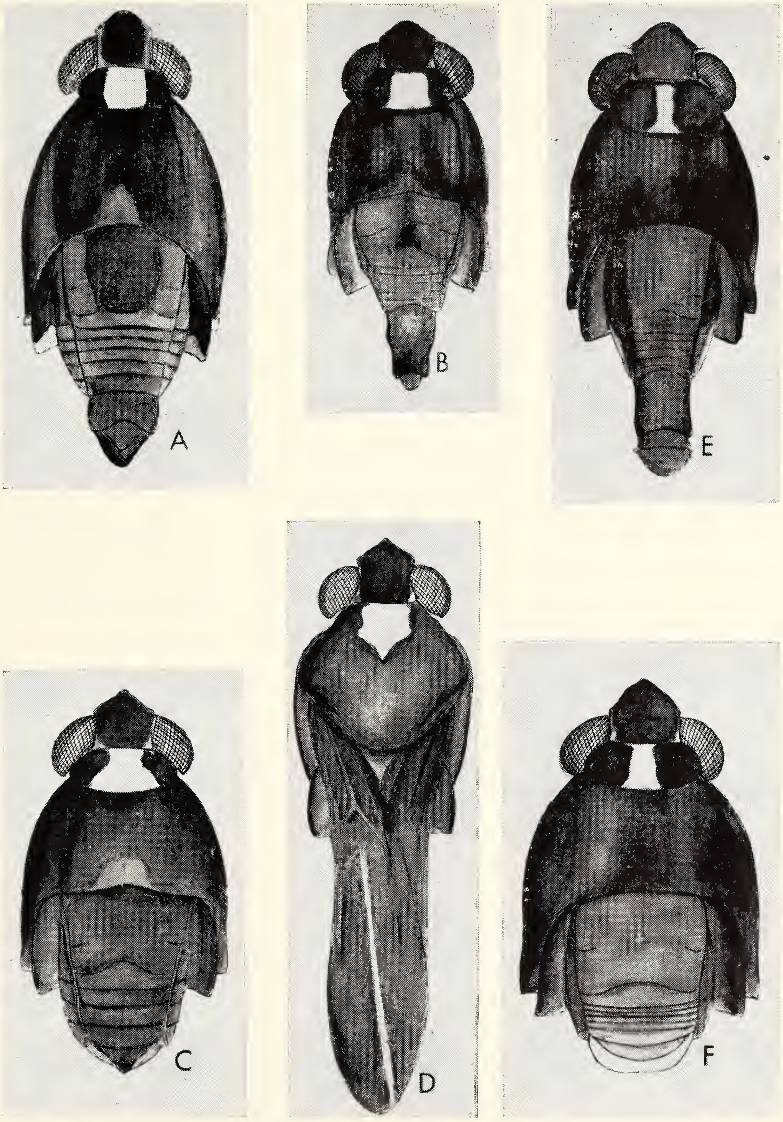
Size. Length of apterous male 2.7 mm.; width across head 0.84 mm.; width across thorax 1.22 mm.

Color. Antenna brown with base of first segment a trifle paler. Vertex surrounded by a fair brown fascia, which is interrupted at the middle of anterior margin. Thoracic dorsum black in ground color, with a yellowish white quadrangular spot on pronotum, and mediocaudal paler spot on mesonotum. Sides of mesothorax and dorsal abdominal segments bluish gray. Venter brown. Front coxa, trochanter, base of front femur, coxa and trochanter of middle leg yellowish white.

EXPLANATION OF PLATE I

A. Wingless male (*M. affinis* Esaki). B. Wingless male (*M. flavonotatus* Esaki). C. Wingless female (*M. flavonotatus* Esaki). D. Winged male (*M. flavonotatus* Esaki). E. Wingless male (*M. solomonensis* Hungerford and Matsuda). F. Wingless female (*M. solomonensis* Hungerford and Matsuda).

HUNGERFORD AND MATSUDA PLATE I



Structural characteristics. Antenna of male moderately slender. The relative lengths of the segments: 1st : 2nd : 3rd : 4th :: 100 : 67 : 50 : 55. Mesonotum of apterous form longer than head and pronotum together. Abdominal venter of male is shown in Pl. II, fig. 1. Note the short eighth segment with two projections on its rear margin.

TABLE I. **The relative lengths of leg segments of male**
(The figures are ocular micrometer units.)

	Femur	Tibia	1st tarsal segment	2nd tarsal segment	Total length of tarsus
Front leg	118	72	10	38	48
Middle leg	230	290	147	68	215
Hind leg	250	112			47

Location of type: A single male taken with the series of *Metrobatopsis flavonotatus* Esaki, bearing the labels "New Guinea Biro '96" and "Erima Astralabe Bay." Preserved in the Hungarian National Museum.

Metrobatopsis flavonotatus Esaki
(Pl. I, B, C, D. Pl. II, figs. 3–5)

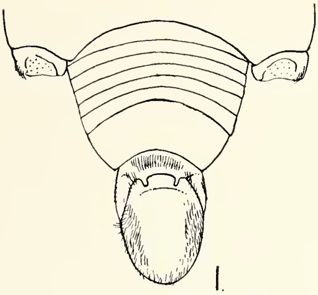
Metrobatopsis flavonotatus Esaki, Ann. Mus. Nat. Hung. 23: 146 (1926)

Dr. Esaki's drawing of the male shows the first antennal segment a little thicker than in any specimens we have seen. While his illustration of the apterous forms of this species shows a large yel-

EXPLANATION OF PLATE II

Fig. 1. Ventral view of abdomen of male (*M. affinis* Esaki). Fig. 2. Male antenna (*M. affinis* Esaki). Fig. 3. Ventral view of abdomen (*M. flavonotatus* Esaki). Fig. 4. Male antenna (*M. flavonotatus* Esaki). Fig. 5. Lateral view of ninth abdominal segment of male (*M. flavonotatus* Esaki). Fig. 6. Ventral view of abdomen (*M. solomonensis* Hungerford and Matsuda). Fig. 7. Male antenna (*M. solomonensis* Hungerford and Matsuda). Fig. 8. Lateral view of ninth abdominal segment of male (*M. solomonensis* Hungerford and Matsuda).

HUNGERFORD AND MATSUDA PLATE II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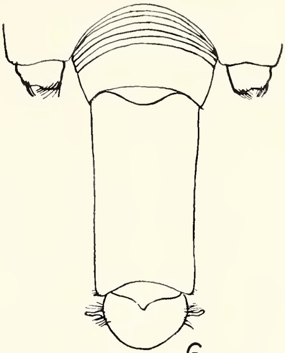
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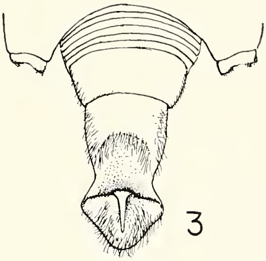
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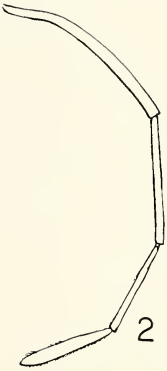
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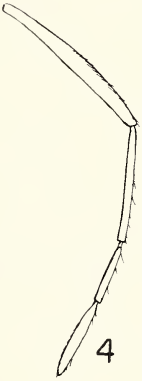
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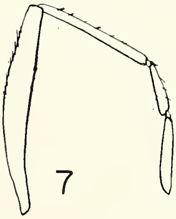
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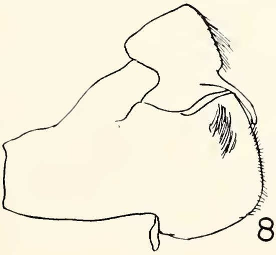
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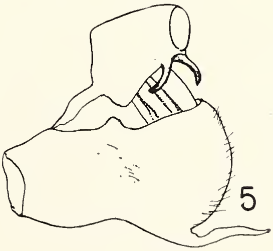
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lowish white to pale brown spot on the mesonotum[2] many specimens of the type series lack this spot as in the illustrations we show of this species. We give a more complete description of this species below.

Size. Length of apterous males 2.1 mm. to 2.2 mm.; width of head 0.798 mm.; width of thorax 1.0 mm.; length of macropterous male 3.1–3.3 mm.; width across humeri 0.966 mm. Length of apterous females 2.3–2.5 mm.; width of head 0.84 mm.; width of thorax 1.2 mm.; length of macropterous female 3.5 mm.; width across humeri 1.05 mm.

Color. *Apterous forms:* Body predominantly black, ventrally pubescent. Head black, posterolateral angles of vertex brown. Eyes dark gray, a little shining. Antennae black with basal portion of first segment yellowish white. Rostrum black. Pronotum black, with central portion broadly yellowish white, forming a rectangular marking. Mesonotum black, often with a yellowish white to pale brown marking that may be triangular, nearly quadrate or entirely lacking and with a more or less triangular-shaped blue gray spot with its base against the caudal margin. Metanotum bluish gray, central median area black, varying in its extent. Mesopleural portion black with a bluish gray stripe. Sternum black, much pubescent with bluish gray. Front leg with coxa black, trochanter and base of femur yellowish white. Middle and hind legs black with coxae and trochanters pale brown. Abdomen above pubescent with bluish gray. *Winged forms:* Pronotum nearly black with a large yellowish white spot at the middle of anterior area being pointed posteriorly at its middle. Hemelytra blackish brown with a more or less obscure longitudinal pale stripe at the middle.

Structural characteristics. Relative lengths of the antennal segments of male: 1st : 2nd : 3rd : 4th : : 95 : 62 : 33 : 45, of female: 83 : 54 : 37 : 48. First male antennal segment a little thicker than that of female. Mesonotum of apterous forms not longer than head and pronotum together. Abdominal venter of male is shown in Plate II, figure 3. Eighth segment long, laterally constricted. Pygophore (ninth segment) vertically rotated and with a long process on the median longitudinal axis. Suranal plate with a stout process on each lateral side, hidden from view until relaxed and lifted (see Pl. I, B). Pronotum in winged forms nearly as long as broad, more or less convex, anterior margin nearly straight, lateral and posterior margins much rounded.

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[2] Not metanotum as stated in the original description.

TABLE II. **The relative lengths of the leg segments of male**
(Figures are ocular micrometer units)

	Femur	Tibia	First tarsal segment	Second tarsal segment	Total length of body
Front leg	110	78	9	29	38
Middle leg	245	325	168	80	248
Hind leg	294	115			46

Location of types. Originally described from the following: 10 ♂♂, 34 ♀♀ forma aptera; 5 ♂♂ 7 ♀♀ forma macroptera. They bear the label "New Guinea: Erima, Astralabe Bay (1896 Biro)." Since no holotype was designated we are labeling a male as a lectotype. The type series belongs to the Hungarian National Museum. One male and one female of this series were given to the University of Kansas collection in 1928.

Metrobatopsis solomonensis, n. sp.
(Pl. I, D, E. Pl. II, 6–8)

Size. Apterous male 2.56 mm. long; width across head 0.88 mm.; width of thorax 1.09 mm.; length of antenna 1.83 mm. Apterous female 2.3 mm. long; width across head 0.942 mm.; width of thorax 1.47 mm.; length of antenna 1.7 mm.

Color. Black with a yellowish spot on pronotum and some silvery or bluish spots on thorax and abdomen. Base of first antennal segment, coxa, trochanter, base of front femur, coxa and trochanter of middle leg, hind trochanter and thoracic venter pale yellow.

Structural characteristics. Male antenna rather short, its first segment nearly as thick as front femur and the last segment somewhat longer than third. Female antenna slender with first and fourth segments slightly thickened. Relative lengths of antennal segments of male: 1st : 2nd : 3rd : 4th : : 115 : 70 : 33 : 49; of female: 80 : 64 : 42 : 50. Rostrum short, not surpassing front coxa. Anterolateral margins of pronotum covered by eyes. Male seventh abdominal segment ventrally as long as five preceding abdominal ventrites and metasternum together. Male eighth segment over three times as long as all preceding seven segments including metasternum. Suranal plate with lateral finger-like processes and hair tufts. In female first abdominal tergite unusually large, second tergite as long medially as following four tergites together, seventh and eighth tergites medially twice as long as sixth, seventh ventrite pale yellow and more or less visible from above.

TABLE III. **The relative lengths of leg segments of male.** (Figures are ocular micrometer units)

	Femur	Tibia	First tarsal segment	Second tarsal segment	Total length of tarsus
Front leg	130	90	10	33	43
Middle leg	290	440	220	80+	300+
Hind leg	430	133			50

Location of types. Described from one male and three poorly preserved females that were mounted on cards. They bear the label "Solomon Islands, T. H. L. Waterhouse" and belong to the South Australian Museum. The male is labeled "Holotype" and one of the females chosen as the "allotype." Mounted on the same cards with these were three males of *M. flavonotatus* and some shriveled specimens.

Comparative notes. The drawings and the key will show how distinct this species is from the two species described by Dr. Esaki. The male eighth abdominal segment is much longer and the lateral processes of the suranal plate are visible as finger-like processes.

KEY TO SPECIES OF METROBATOPSIS

1. Eighth ventral abdominal segment of male shorter than wide, with two protuberances on rear margin. . . . *M. affinis* Esaki
1. Eighth ventral abdominal segment of male longer than wide and without protuberances on rear margin. 2
2. Eighth abdominal segment of male laterally constricted. Pygophore with a long ventral process on median longitudinal axis. . . . . *M. flavonotatus* Esaki
2. Eighth abdominal segment of male not laterally constricted. Pygophore with an inconspicuous ventral process on median longitudinal axis. *M. solomonensis* Hungerford and Matsuda

UNDESCRIBED SPECIES OF NEMATOCEROUS DIPTERA. PART VI.[1]

By Charles P. Alexander, Amherst, Mass.

The preceding part under this general title appeared in 1958 (Bul. Brooklyn Ent. Soc. 53: 48–52). The types of the novelties here considered are preserved in my personal collection, with the exception of that of *Radinoderus toxopei* which will be returned to the Government Natural History Museum, Leiden, Netherlands. I am very greatly indebted to Dr. M. A. Lieftinck for the privilege of studying the Tipuloidean flies of the Third Archbold Expedition to New Guinea, 1938–39.

TANYDERIDAE

Radinoderus toxopei, n.sp.

Size large (wing of female about 20 or more mm.); legs yellow, the femoral tips rather narrowly black, the tibial bases more broadly so; wings whitish with a delicate solidly infuscated pattern, the chief marks being two X-shaped areas that are broadly confluent in cell *C,* with further darkenings at wing base and tip; abdomen dark brown, segments two to seven, inclusive, with conspicuous silvery white lateral areas on both tergites and sternites.

Male: Length about 16–20 mm.; wing 15–18.5 mm.

Female: Length about 24–27 mm.; wing 19.5–23 mm.

Rostrum and palpi black. Antennae of male 24-segmented, of female 21-segmented; scape black, pedicel dark brown, flagellum yellow; flagellar segments subcylindrical, with very long outspreading pale setae. Head light gray; anterior vertex narrow, only about one-half the diameter of the scape.

Cervical region elongate, dark brown, a little paler on sides. Pronotum dull brownish gray. Mesonotal praescutum reddish brown, with four darker brown stripes, the intermediate pair narrowly separated, lateral praescutal border weakly darkened; scutal lobes dark brown, the central area infuscated, with light gray spots on either side of the median line and again at base of scutellum; posterior sclerites dark brown. Pleura dark brown, more or less pruinose; dorsopleural region darkened. Halteres with stem yellow, knob dark brown. Legs with coxae brownish gray; tro-

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[1] Contribution from the Entomological Laboratory of the University of Massachusetts.

chanters light brown; femora yellow, the tips rather narrowly blackened; tibiae similarly yellow, with the bases slightly more extensively blackened; remainder of legs yellow, terminal two tarsal segments brown. Wings whitish, with a delicate brown pattern, the pale areas subequal in amount or slightly more extensive than the dark; patterned areas appearing chiefly as two X-shaped marks, broadly interconnected in the costal region at end of *Sc;* areas solidly darkened, slightly paler behind, without differentiated margins, as in some allied species; further darkenings at base, broken by four white spots located in cell *C* beyond *h,* before arculus, and in bases of cells *R* and *M* beyond the arculus, and at base of Anal cell; wing tip also darkened, solidly in cell R_2, including parts of cells R_1 and R_3, all connected with the outer crossband in cell R_4; small seams at tips of veins R_1, R_4 and M_3, in cases more reduced or obliterated; veins yellow, slightly darker to infuscated in the patterned areas.

Abdomen dark brown, with conspicuous obscure yellow areas on the basal rings; tergites two to seven, inclusive, with a very conspicuous arcuated to oval silvery white nearly lateral area, sternites with a comparable more nearly straight lateral marking; genitalia of both sexes brownish black. Cerci oval in outline, the tips broadly obtuse.

Habitat: Netherlands New Guinea.

Holotype: ♂, Moss Forest Camp, Third Archbold Expedition, 2700 meters, October 21, 1939 (L. J. Toxopeus). *Allotopotype:* ♀, October 10, 1939. *Paratopotypes:* 1 ♂, 1 ♀, October 28–31, 1939. *Paratype:* 1 ♀, Araucaria Camp, Third Archbold Expedition, 2275 meters, March 31, 1939 (L. J. Toxopeus). Type in the Government Natural History Museum, Leiden; paratypes in the American Museum of Natural History and collection of the author.

I dedicate this interesting fly to the collector, Dr. Lambertus Johannes Toxopeus, entomologist of the Third Archbold Expedition to New Guinea, 1938–39. The great series of Tipulidae taken by Toxopeus on this noteworthy expedition to the Snow Mountains of Netherlands New Guinea are being described by the writer in another series of reports. There now are five species of Tanyderidae known from New Guinea, all belonging to the genus *Radinoderus* Handlirsch. The only regional species having the leg pattern about as in the present fly is *Radinoderus oculatus* (Riedel), of extreme eastern New Guinea, which is best distinguished by the more ocellate arrangement of the darkened areas of the wing. The other regional species include *R. mirabilis* (de Meijere), *R. pictipes* Alexander, and *R. supernumerarius* Alexander, all distinguished by characteristic wing and leg patterns. Outside of New Guinea, *Radinoderus* is represented by the genotype, *R. ornatissimus* (Doleschall) of Amboina, *R. holwayi* Alexander and *R. solomonis* Alexander of the Solomon Islands, and by three species in Australia, *R. dorrigensis* Alexander and *R. terrae-reginae* Alexander in the east, and *R. occidentalis* Alexander, in the west.

Radinoderus mirabilis (de Meijere)

Tanyderus mirabilis de Meijere, 1915, Nova Guinea, 13, Zool. 1: 51–52, fig. 1 (wing).

Type from Kloof-Biwak, October 29, 1912 (Versteeg). Third South New Guinea Expedition.

Additional records: Netherlands New Guinea—Utakwa River, September 1912–March 1913 (A. F. R. Wollaston); British Museum. Araucaria Camp, 2600 meters, March 9, 1939 (L. J. Toxopeus); Third Archbold Expedition, in Leiden Museum.

The latter specimen shows a weak supernumerary crossvein in cell R_3 of the wings, such as occurs in the type specimen of *Radinoderus supernumerarius* Alexander, discussed below.

Radinoderus supernumerarius Alexander

Radinoderus supernumerarius Alexander, 1953, Bul. Brooklyn Ent. Soc. 48: 97–98.

Type, a male, from Netherlands New Guinea—Iffar, Lake Sentani, near Hollandia, August 1936, swept from foliage over stream (L. E. Cheesman); British Museum. One further specimen seen by me, Markham River Valley, Nadzab, May 5–17, 1944 (K. V. Krombein).

This latter specimen lacks the supernumerary crossvein in cell R_3 of the wings but agrees with the type in all other regards, including the small size, variegated wing bands and uniformly infuscated legs. It seems evident that the presence or absence of the supposed supernumerary crossvein in the present fly and in *R. mirabilis* is an adventitious rather than a supernumerary character.

CECIDOMYIDAE

Catotricha antennata, n. sp.

Size very large (wing of male about 10 mm.); antennae brownish black, the flagellar verticils very long and outspreading; mesonotal praescutum and scutum light gray, with four dark brown to blackish stripes, scutellum and postnotum brownish yellow; halteres yellow; tibiae and tarsi brownish black; wings weakly tinged with brown, patterned with darker brown, especially as a large cloud in outer half of cell *M* at and beyond the bend of vein Cu_1.

Male: Length about 7.5 mm.; wing 10 mm.; antenna about 8.8 mm.

Rostrum and palpi brownish black. Antennae of male dark brown to brownish black; scape about twice as long as the pedicel; outspreading verticils of flagellar segments very long, the longest only a little less than the segments. Head black, pruinose to appear plumbeous, more heavily so on the posterior orbits and genae; anterior vertex very narrow, somewhat less than the width of two ommatidia, strongly bilobed immediately behind the antennal bases.

Pronotum dark brown, narrowly yellowed behind. Mesonotal praescutum and scutum light gray, with four dark brown to blackish stripes, the intermediate pair confluent in front, with conspicuous yellow setae on the interspaces; scutellum and postnotum pale brown to brownish yellow. Pleura dark brown, sparsely pruinose, paling to more reddish on the ventral sternopleurite. Halteres uniformly yellow. Legs with coxae and trochanters yellow; femora yellow basally, the outer half appearing darker because of the dark vestiture; tibiae and tarsi brownish black to black. Wings weakly tinged with brown, patterned with darker brown behind vein *1st A* and as a larger cloud in outer half of cell *M*, at and beyond the bend of vein Cu_1; veins dark brown. Venation: Sc_1 distinctly reaching the costa, ending about opposite to just beyond one-third the length of vein M_{1+2}. In *nipponensis*, *Sc* is shorter, Sc_1 ending about opposite one-fourth the length of M_{1+2}.

Abdomen black, with conspicuous yellow setae; hypopygium fulvous.

Habitat: Japan (Honshu).

Holotype: ♂, Akigami, On-take, Shinano-Hida, 1800 meters, October 4, 1957 (Toshio Mishima).

I am indebted to Mr. Mishima for several interesting Tipulidae from various parts of Honshu. The present fly differs from *Catotricha nipponensis* (Alexander) in the larger size, very conspicuous flagellar verticils, and in details of coloration and venation. Following Tillyard's interpretation of venation, in the present fly *M* is three-branched, with M_{1+2} forking outwardly into M_1 and M_2 and with M_3 arising far basad, the stem of *M* thus being very short. Both Edwards and I interpret *M* as being simply forked and consider that the M_3 of Tillyard is actually Cu_1.

BLEPHAROCERIDAE

Blepharocera micheneri, n.sp.

Size medium (wing of male 6.5 mm.); general coloration of mesonotum buffy, with threee brownish gray stripes; antennae with terminal segment very long, the penultimate unusually short; compound eyes of male unequally divided, the dorsal area approximately one-half as extensive as the lower part; outer radial veins of wing with numerous macrotrichia over their entire length; male hypopygium with the dististyle unusually small, the outer style trilobed, all lobes with setae.

Male: Length about 7 mm.; wing 6.5 mm.; antenna about 2 mm.

Head brown. Antennae with terminal flagellar segment very long, approximately equal to the preceding four segments combined; penultimate segment greatly reduced, about one-third the length of the antepenultimate. Eyes of male unequally divided, the dorsal area of enlarged ommatidia less extensive than the lower, being approximately one-half as large.

Pronotum brownish gray. Mesonotal praescutum and scutum buffy, with three darker brownish gray stripes, the central one continued caudad to the scutellum, the laterals interrupted by the sutures; scutellum and postnotum yellow. Pleura yellow, the propleura and anepisternum darker. Halteres with stem yellow, clearest on basal half, knob dark brown. Legs with all coxae and trochanters light yellow; remainder of legs obscure yellow, the outer tarsal segments slightly more infuscated. Wings subhyaline, the costal border more yellowed with brownish yellow veins, remaining veins brown. Both branches of *Rs* with numerous macrotrichia over their entire length. Venation: Cell R_3 at margin relatively extensive, approximately four-fifths cell R_4; cell M_4 narrowed at base.

Abdomen brown, the incisures paler; hypopygium yellowish brown. Male hypopygium with each tergal lobe subrectangular, narrowly separated at midline, surface of outer half and along mesal margin with conspicuous setae. Basistyle long; dististyles two, very small in proportion to the size of other parts; outer style unequally trilobed at apex, all lobes setiferous, the smaller upper one with four large setae, the other lobes with more abundant but smaller bristles; inner style a glabrous blade, narrowed outer third to the obtuse tip. Phallosome very large, broad-based, narrowed to the subtruncated apex. Filaments of the penis very long and slender, all equal in length and diameter, very slightly dilated and truncated at outer ends.

Habitat: California (Riverside County).

Holotype: ♂, Idyllwild, San Jacinto Mts., May 22, 1940 (C. D. Michener); California Academy of Sciences, Thomas Aitken, leg.

This distinct fly is named for the collector, Dr. Charles D. Michener, outstanding student of the Lepidoptera, Hymenoptera and Acarina. It is readily told from the other regional members of the genus, including *Blepharocera jordani* Kellogg, *B. osten-sackeni* Kellogg, and *B. shastensis,* n. sp., by the structure of the eyes and antennae and the details of the male hypopygium. In the trichiation of the outer radial veins of the wing it is more like *B. jordani.*

Blepharocera shastensis, n.sp.

Size small (wing of male about 4.5 mm.); general coloration of thorax buffy yellow in male, darker in female; praescutum and scutum with darker stripes; antennae short, terminal segment from one and one-half to twice the penultimate; eyes unequally divided, the upper area in the male much more extensive than the lower; mandibles lacking in both sexes; wings with macrotrichia of outer veins very reduced in number, lacking on R_4 and restricted to the outer half of R_5; male hypopygium with the outer dististyle subrectangular in outline, its outer apical angle a little produced, with strong setae; inner style very unequally bifid, the blades obtuse at tips.

Male: Length about 3.8–4 mm.; wing 4.3–4.5 mm.; antenna about 1–1.1 mm.

Female: Length about 4.5–5 mm.; wing 5–5.5 mm.; antenna about 0.8–0.85 mm.

Rostrum obscure yellow; palpi pale yellow to brownish yellow. Mandibles lacking in both sexes. Antennae short, dark brown to brownish black; basal flagellar segments short, nearly as long as broad, the outer ones progressively longer and more slender; terminal segment from one and one-half to nearly twice the penultimate, the latter a very little shorter than the antepenultimate. Head gray; male with eyes unequally divided, the dorsal area of larger ommatidia much more extensive than the lower, in cases to approximately twice as much, in living specimens rich cinnamon brown in color. In the female the upper area is much reduced in size, approximately one-fifth the size of the lower or less.

Thorax with ground buffy yellow in male, darker brownish gray in female; in the male with darker brown praescutal stripes, the yellow interspaces restricted. Pleura pale, more or less pruinose.

Halteres with stem yellow, knob brownish black. Legs with coxae and trochanters yellow; remainder of legs brownish yellow, tips of femora more infuscated, outer tarsal segments brownish black. Wings subhyaline; veins brown. Macrotrichia of veins unusually reduced in number, in the outer radial field with none on R_4 and relatively few (about 2 to 15) on the outer third of R_5.

Abdomen of male with intermediate segments bicolored, dark brown, the incisures yellow, the color involving the narrow posterior margins and the broader bases of the segments; outer segments, including hypopygium, black. In the female, abdomen more uniformly darkened. Male hypopygium with the posterior border of tergite emarginate, lobes rounded, the setae restricted to the outer parts. Outer dististyle subrectangular in outline, outer apical angle a little produced and strongly setiferous; inner style very unequally bifid, both blades obuse at tips. Filaments of penis obliquely acute at tips.

Habitat: California (Shasta County).

Holotype: ♂, Castle Crags State Park, along the Sacramento River, 2000 feet, July 30, 1958 (C. P. Alexander). *Allotopotype:* ♀, pinned with type. *Paratopotypes:* ♂♀, July 29–30, 1958.

This very interesting net-winged midge is quite distinct from all other species known from western North America. It is the smallest American member of the genus, being exceeded in this respect only by *Blepharocera japonica* Kitakami, of Japan, which seems to be its nearest ally. *B. japonica* and *B. shastensis* have the macrotrichia of the wing veins greatly reduced in number, being entirely lacking on vein R_4. All other western North American species, including *B. jordani* Kellogg, *B. micheneri,* n. sp., and *B. osten-sackeni* Kellogg, have these trichia much more numerous, including long to complete series on both R_4 and R_5. The loss of the mandibles in the female of the present fly is noteworthy and apparently is the first record of such an occurrence in the genus although it is known in certain other exotic genera of Blepharoceridae. As noted by various authors, the mandibles in females in this family either are fully developed or else are quite lacking, there being no evidence of progressive reduction in the size of the organ. The most recent comprehensive summary of the family is in a paper by the writer.[2]

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[2] Alexander, Charles P. Geographical distribution of the net-winged midges (Blepharoceridae, Diptera). Proc. Tenth Internat. Cong. Ent. 1: 813–828, 23 figs. (venation), 3 maps; December, 1958.

THE IMMATURE STAGES OF *LYPE DIVERSA* (BANKS) (TRICHOPTERA, PSYCHOMYIIDAE)[1]

By Oliver S. Flint, Jr., Ithaca, New York[2]

The genus *Lype* contains a single Nearctic species described by Banks (1914) as a *Psychomyia.* However, there are several European species. The immature stages of our species have remained undescribed until now, although some European species have been known for a number of years (Lestage, 1921; Hickin, 1950, 1954).

Larva. Length 7–8 mm.; long and slender; of uniform thickness from head to end of abdomen.

Head. Posterior two-thirds of entire head capsule brown; anterior third yellowish; oral margin darker; muscle insertion marks dark but very indistinct, the 3 or 4 on posterior part of frontoclypeus most noticeable (fig. 1). Mandibles (figs. 6, 7) triangular, symmetrical except as left one bears a large brush divided into 2 portions. Long central spinnerette (?) on maxillo-labium (fig. 3).

Thorax. Pronotum brown (fig. 1) with pale spots around bases of setae; prosternum with a narrow sclerotized band along posterior margin. Meso- and metanotum each with 3 pairs of setae, 2 along anterior margin, the other posterior to antero-medial pair. Proepimeron enlarged into a hatchet-shaped spur (fig. 2). Legs pale brown, short; all pairs of same length; fore leg slightly thicker.

Abdomen. No gills nor lateral line. Eighth segment dorsally with a pair of long slender submedian setae; ninth segment with 2 pairs of long setae dorsally, another pair ventrally. Sclerite of anal proleg (fig. 5) brown; claw straw colored; no ventral teeth on claw.

Pupa. Length about 6 mm. The specimen described was emerging and poorly preserved, making accurate description difficult.

Head. Four long black setae near center of front. Mandibles with an inflated basal portion and a long slender apical part (terminal appendage broken off?). Antennae reaching base of apical appendages. Maxillary palpi with terminal segments curled inwardly.

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[1] I wish to acknowledge the assistance of the Grace H. Griswold Fund for assuming the expense of engraving the plate.

[2] Department of Entomology and Limnology, Cornell University.

FLINT

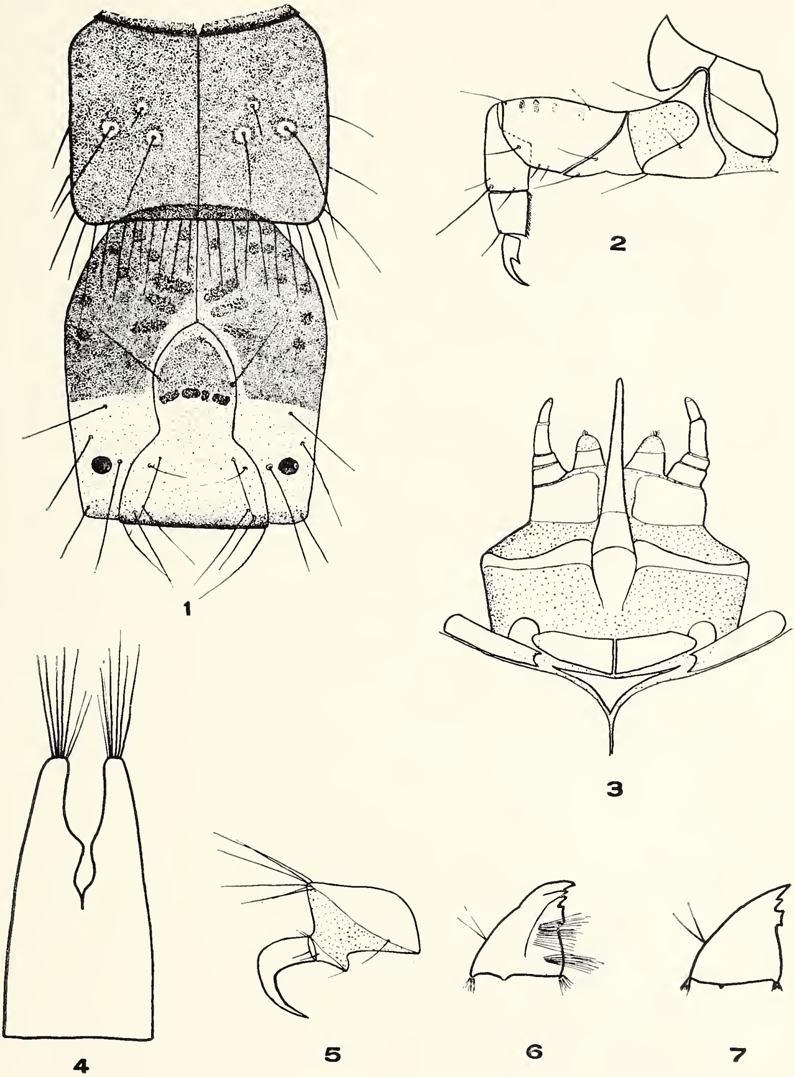

Fig. 1. Larval head and pronotum, dorsal. Fig. 2. Larval prothoracic leg and pleuron, posterior and slightly dorsal. Fig. 3. Larval maxillo-labium, ventral. Fig. 4. Pupal apical processes, dorsal. Fig. 5. Larval anal proleg, lateral. Fig. 6. Larval left mandible, anterior. Fig. 7. Larval right mandible, posterior.

Thorax. Tarsi of middle legs with a well developed hair fringe. Wing cases extending to about posterior margin of 5th abdominal segment.

Abdomen. Hook plates anteriorly on segments 2–8, posteriorly on segment 5. Anterior plates of segments 2–5 each with 7–8 hooks along posterior margin; plates on segment 6 small, oval, placed between the posterior plates of segment 5, and bearing 4–5 hooks around anterior margin; plates of segments 7–8 with 6–7 hooks; posterior plates of segment 5 about same size as anterior plates on 5, but with the 7–8 hooks pointing forward. No gills nor lateral line. Apical appendages (fig. 4) long, about twice as long as wide at base of segment, and divided for about half of length of segment; apex of appendages bearing a cluster of black, stout setae.

Comparative notes. The larvae will key to couplet 5 in Ross's (1944) key to the genera of Psychomyiidae. *Lype* differs from both alternatives in shape of mandibles and their brushes, and in coloration. Judging from the descriptions of the European species, the genus *Tinodes,* which is present in western North America, is very similar to *Lype.* It should differ in the possession of small teeth ventrally on the anal claws and in the shape of the mandibles. The pupae may be recognized immediately by the shape of the apical appendages. The European species are described as having the apex of the pupal mandibles recurved and bearing teeth. Since this structure is lacking in the specimen examined, it may be broken off.

Material examined. 8 larvae, 1 male pupa, Highlands, N. Car., July 1, 1959; 58 larvae, McLean, N.Y., Sphaerium Br., Sept. 23, 1957; 3 larvae, Zealand Campground, White Mountains, N. H., May 18, 1957.

Biology. All the collections were made in small, rather slow-flowing brooks. The larvae construct channels in submerged wood. The larval and pupal shelters are nearly impossible to see as they are covered by silk and frass. If pieces of rotting board are available, they congregate on these, channelling in the softer spring wood leaving the more resistant summer wood to form the sides of the shelter. The entire McLean collection was made on one piece of board about 6 × 12 inches. The single pupa studied was sheltered in a cylinder of silk and frass having a silken sieve plate placed at either end, allowing circulation of water. Based on collection records, the species overwinters as larvae, emerging over most of the summer.

LITERATURE CITED

Banks, N. 1914. American Trichoptera—notes and descriptions. Harvard Mus. Comp. Zool. Bul. 62: 253.

Hickin, N. E. 1950. Larvae of the British Trichoptera—29. *Lype reducta* Hagen. Proc. R. Ent. Soc. London (A) 25: 71–74.

———1954. Larvae of the British Trichoptera-44. *Lype phaeopa* Steph. Ibid. 29: 93–95.

Lestage, J. 1921. *In* Rousseau. Les larves et nymphes aquatiques des insects d'Europe. Vol. 1, pp. 517, 524–27.

Ross, H. H. 1944. The caddis flies, or Trichoptera, of Illinois. Bul. Ill. Nat. Hist. Surv. 23(1) : 52–53, 74.

A PROPOSED LIST OF THE APHIDS OF NEW YORK

By MORTIMER D. LEONARD, Washington, D. C.

In the fall of 1932, while I was spending a few weeks on vacation at Cornell, Professor C. R. Crosby suggested that I take up the collection and study of aphids. A little sample collecting around Ithaca revealed plant lice to be abundant on many kinds of plants at the time and this, together with the recent appearance of Hottes and Frison's bulletin, "The Aphididae or Plant Lice of Illinois," at once aroused my interest which, albeit somewhat intermittently, has continued throughout these 26 years.

Because of my long interest in the insects of New York, my principal objective at once became a study of the distribution and food-plants of the aphids of New York. During the next 4 years—until Professor Crosby's death early in 1937 and shortly thereafter my own cessation of trips in the State—both Crosby and I collected aphids at every opportunity and rather widely in New York. Dr. A. N. Tissot of Florida, made or checked the determinations of our several hundred collections.

The "List of the Insects of New York," published in 1928 as Cornell Memoir 101, contained a list of 128 species of aphids, based chiefly on records compiled by Dr. Felt. Following the first four seasons of collecting by Crosby and myself, I published a supplement to this list of aphids which added 42 species together with extensions of distribution of 29 other species (Jour. N. Y. Ent. Soc. 44: 177–185, 1936). This made a total of 170 aphids known to occur in New York.

Since the mid 20's, Dr. Grace Griswold of the Department of Entomology at Cornell had been interested in aphids occurring on greenhouse and ornamental plants. Beginning in 1938, she was able to devote full time to the study of aphids on all plants as a recipient of a grant from the Purnell Fund for this purpose. From then until her tragic death early in 1946, she collected extensively in the vicinity of Ithaca and in several other localities and was able to encourage a number of the staff members and students to get aphids for her. The Cornell Collection contains many hundreds of slides beautifully prepared by Miss Griswold. Many of these are even as yet undetermined. Hers is probably the most important single contribution to our knowledge of the aphids of New York.

After casually collecting aphids over a period of many years, Roy Latham, the veteran farmer-naturalist of Orient, Long Island, began at my suggestion to collect aphids more intensively in 1946. Through this present year he has made about 700 individual collections on Eastern Long Island from well over 200 accurately specifically determined food-plants. His is certainly one of the most important single contributions to a knowledge of the aphid fauna of New York. Chris E. Olsen collected aphids at Maspeth, Long Island, for two seasons, 1913 and 1914. His resulting paper lists 53 species (Bul. Brooklyn Ent. Soc. 16: 14–19, 1921). Despite his work and considerable collecting by Blanton at Babylon and by Crosby and Leonard at various Long Island localities, it is largely because of Latham's enthusiastic and persistent efforts that over 50 percent of all the aphids so far listed for New York are known to occur on Long Island.

Some of the others who have collected aphids somewhat more than casually in the State are: Paul Hayhurst who made 50-odd collections in 1905; Harold E. Morrison in 1914–15; Roy Hansberry and Kenneth E. Maxwell in the mid 30's and several members of USDA's "Special Survey in the Vicinity of Ports of Entry" in 1943–45. During 1958 L. L. Pechuman has made about 50 collections and Chris E. Olsen, John Graham, and G. N. Wolcott a few each. J. A. Wilcox of the N. Y. State Museum also has submitted several collections.

Dr. Asa Fitch, the first State Entomologist of New York, described, between 1851 and 1872, a number of what later became our commonest and best known aphids. These constitute some of the earliest records of aphids in the United States. New York is, however, unique in that Rafinesque, as a brilliant young French naturalist, collected near Newburg and described in 1817 what later became known as *Macrosiphum rudbeckiae* (Fitch), our common and widespread Goldenglow Aphid. In the same paper, in the first volume of the American Monthly Magazine, he also described an aphid, collected by him in Long Island which later became known as *Macrosiphum erigeronensis* (Thomas), our common Canadian Fleabane Aphid. These, together with several other new species described at the same time by Rafinesque, are considered to be the first recognizable descriptions of aphids in the United States.

To date, about 230 species of aphids, some recorded only once, are known to occur in New York on a total of well over 300 foodplants. The data with each species consist of each locality at which the species occurs together with date, food plant, collector and authority for the record. Notes on abundance and economic importance are also included when known. A great many collections still remain to be determined. At least one hundred additional species of aphids should more nearly represent an approach to the saturation point. New York is the largest of the Northeastern States, having an area of about 49,500 square miles. It rises, in the great area of the Adirondacks, to as high as 5300 feet. The mountains higher than about 3500 feet rise into the Hudsonian zone with conditions much like those of Labrador; the tops of at least three peaks are Alpine in character. On the other hand, the Coastal Plain, which comprises all of Long Island, Staten Island and the vicinity of New York City contains many Southern elements. The number of species of flowering plants in New York is estimated to be about 3000 which fall into about 800 genera. Aphids have been collected from only about 500 species in 260 genera and determined so far from only about 300 species in 230 genera. It is thus seen that many more plants are yet to be examined for the possibility of their harboring aphid hosts.

By way of comparison, it may be of interest to note that Dr. J. O. Pepper writes me he knows of about 300 aphids that occur in Pennsylvania. This is the second largest of the Northeastern States with an area of 45,333 square miles. It is believed that New York should have the larger number of aphids of the two.

I might add that the only other Northeastern States in which aphids have been more than casually collected are Maine (almost entirely by Edith Patch but more recently by Simpson), Connecticut (chiefly by Britton, Walden and Bourne and during the past few years by Kring) and New Jersey mostly by Leonard, whose recently published list (Jour. N. Y. Ent. Soc. 64: 99–124, 1956) totals 143 species from 122 food-plants. Dr. Simpson writes me that in Maine Miss Patch kept a "Systematic file" of the species in her collection which he has kept up to date and which now totals about 380 species. Even though some of these are manuscript names this figure is rather remarkable when it is considered that Colorado, which has been intensively collected over a period of 60 years by several aphid specialists, has somewhat fewer species recorded. Dr. Kring writes that he now has records of about 177 species in Connecticut.

It was felt that the members of this Branch[1] might be interested in the foregoing brief statement of activities within their area looking towards a greater knowledge of this systematically difficult but intriguing and economically important group of insects—the aphids. So little is really known as yet of the aphid fauna of almost any region that it is relatively easy, by spending very little time, to make substantial additions to distribution and food-plant records. Chapman and Gambrell collecting at Geneva and Cazier and Gertsch collecting near New York City demonstrated this fact some years ago. I hope some of you may be encouraged to do likewise in your respective States.

PACHYHELEA, A NEW GENUS OF AMERICAN CERATOPOGONIDAE RELATED TO *PALPOMYIA* (DIPTERA)

By Willis W. Wirth[1]

Study of the type of *Ceratopogon pachymerus* Williston and of the types of its synonyms, *Ceratopogon magnus* Coquillett and *Johannsenomyia latifemoris* Ingram and Macfie, reveals that this species is not closely related to any known genus of Ceratopogonidae. Therefore, a new genus is proposed for it.

Pachyhelea Wirth, new genus

Type species. *Ceratopogon magnus* Coquillett. I am selecting this synonym of *Pachyhelea pachymera* (Williston) as type because there may be some doubt as to the identity of *pachymera*. The holotype of *pachymera* has only one radial cell, a character I regard as extremely unreliable (see discussion under *P. pachymera*).

---

[1] This paper presented at the Thirtieth Annual Meeting of the Eastern Branch, Entomological Society of America, Baltimore, Maryland, November 24–25, 1958.

[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture.

Diagnosis of female. Body very stout and almost bare. Eyes bare and broadly separated. Palpus short and slender, third segment not enlarged. Antenna with segments 3–10 oval, 11–15 long and cylindrical, all with short, sparse verticils. Scutum very robust, with a short, conical, sharp, anterior spine on anterior midline; humeral pits well developed. Surface of scutum and scutellum with short fine hairs only, no stout bristles. Postscutellum very prominent, due to pronounced upward deflection of scutellum. Abdomen stout, slightly petiolate at base, slightly drooping on distal half, seventh tergum much narrowed, longer than broad. Legs rather stout, hind coxa greatly enlarged; hind femur greatly swollen and bowed outwardly, curling up and back around the sides of the abdomen; hind tibia slightly thickened and sinuate; femora and tibia without spines. First tarsomere on hind legs about 3 times length of second, slightly longer than 2–5 combined, 3 and 4 very short, 4 slightly cordate, 5 slender and armed ventrally on distal half with three pairs of slender, pointed black spines which are not true batonnets. Claws equal, each with a small mesal tooth at base; small on fore and mid legs, about half of length of fifth tarsomere; on hind legs much longer, about two-thirds as long as fifth tarsomere. Wing broad, anal lobe only moderately developed; macrotrichia absent, microtrichia well developed. Costa rather long, extending to 0.83 of distance to wing tip, not produced beyond tip of vein R_{4+5}; two very narrow radial cells present, the second 2.1 times as long as first; the crossvein very short, scarcely longer than broad (apparently absent in type of *Ceratopogon pachymerus* Williston). Medial fork broadly sessile, veins M_1 and M_2 both bow posteriorly in middle; mediocubital fork just beyond level of r–m crossvein; anal vein forks at proximal third of anal cell with posterior fork proceeding obliquely nearly to posterior wing margin.

Comparative notes. *Pachyhelea* is closely related to *Palpomyia* Meigen in general features, but differs in the very short (rudimentary) radial crossvein and unarmed femora. The peculiarly swollen hind femora are unique, as distinctively swollen as in *Serromyia* Meigen, but unarmed and of different structure, more closely resembling *Sphaeromias* Curtis. *Pachyhelea* cannot be allied very closely with *Johannsenomyia* Malloch and *Sphaeromias,* both of which usually have two radial cells with a very short, radial crossvein. These genera have typical ventral blunt spines (batonnets) on the fifth tarsomere, the fourth tarsomere is cylindrical, and the claws are externally barbed. Moreover, *Sphaeromias,* some species of which have somewhat thickened femora, has ventral femoral spines and *Johannsenomyia,* always with slender femora, has them unarmed.

Pachyhelea pachymera (Williston), new combination

Ceratopogon pachymerus Williston, 1900, Biol. Cent. Amer., vol. 1, suppl., p. 224 (female; Mexico).

Probezzia pachymera, Malloch, 1914, Proc. Biol. Soc. Washington 27: 137.

Ceratopogon magnus Coquillett, 1905, J. New York Ent. Soc. 13: 61 (female; Texas). *NEW SYNONYMY.*

Johanneniella magna, Malloch, 1914, Bul. Illinois St. Lab. Nat. Hist. 10: 227.

Johannsenomyia magna, Malloch, 1915, idem. 10: 338.

Sphaeromias albidiventris Kieffer, 1917, Ann. Mus. Nat. Hungarici 15: 317 (female; Colombia). *NEW SYNONYMY.*

Johannsenomyia latifemoris Ingram and Macfie, 1931, Dipt. Patagonia & S. Chile, part II, fasc. 4, p. 231 (female; Argentina); Macfie, 1940, Proc. R. Ent. Soc. London (B) 9: 75 (male; Brazil). *NEW SYNONYMY.*

I have examined the types of *pachymerus* Williston and *latifemoris* Ingram and Macfie in the British Museum (Natural History) and that of *magnus* Coquillett in the U. S. National Museum. They agree closely with Ingram and Macfie's excellent and detailed description of *latifemoris.* The synonymy of *albidiventris* Kieffer is from the original description, as the type in the Hungarian Museum in Budapest was presumably destroyed in the 1956 disturbances.

Apparently the female Williston described as *pachymerus* differs from all other known specimens of this species in having only one radial cell. In related genera the presence or absence of a radial crossvein is a variable character, in some species even being present on one wing and absent on the other of the same individual. Therefore, its absence in the type of *pachymerus* is not considered to be of specific, to say nothing of generic, value.

New Record: Panama; Fort Davis, C. Z., Aug. 28, 1952 (F. S. Blanton) light trap, 1 ♀.

Correction. The mailing date of the preceding issue of the Bulletin was March 12, not February 12 as indicated.

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BULLETIN

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UNDESCRIBED SPECIES OF NEMATOCEROUS DIPTERA. PART VII.[1]

By Charles P. Alexander, Amherst, Mass.

The preceding part under this general title appeared in 1959 (Bul. Brooklyn Ent. Soc. 54: 37–43). In the present report I am considering new species in the Nematocerous families Tanyderidae, Ptychopteridae, Trichoceridae and Dixidae, the types of the novelties being preserved in my collection except where indicated to the contrary.

TANYDERIDAE

Protanyderus schmidi, n. sp.

Size medium (wing of female 8.5 mm.); general coloration of mesonotum and abdomen brown, the praescutal interspaces and abdomen with small darker brown spots; legs yellow, femora slightly darkened outwardly, outer tarsal segments black; wings whitish subhyaline, conspicuously crossbanded with dark brown, the areas oblique; cells *1st* M_2 expanded outwardly, with vein M_2 deflected caudad narrowing cell M_3 at margin, cell M_4 being correspondingly extensive.

Female: Length about 7.5 mm.; wing 8.5 mm.

Rostrum brownish yellow pollinose, black at apex; palpi black; remaining mouthparts brownish black. Antennae black throughout, unusually small; flagellar segments subcylindrical, about one-half as long as the largest verticils. Head brownish gray, variegated by darker brown areas, especially on anterior part where the surface at midline is slightly depressed; posterior vertex chiefly dark brown, paler on orbits; anterior vertex relatively broad, nearly three times the diameter of scape.

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[1] Contribution from the Entomological Laboratory, University of Massachusetts.

Cervical region medium brown, only moderately elongated; pronotum grayish brown. Mesonotal praescutum chiefly covered by four brown stripes that are separated from the nearly concolorous ground by longitudinal rows of black setigerous punctures on the interspaces; scutal lobes brownish gray, slightly more brightened behind the suture, each lobe with a curved row of setigerous punctures; scutellum brown, large and swollen, with long yellow setae; postnotum reduced, light brown. Pleura brown, very sparsely pruinose, especially on the sternopleurite. Halteres with stem obscure yellow, knob brownish black. Legs with coxae brown; trochanters yellowish brown; remainder of legs chiefly clear yellow, the outer ends of the femora slightly infuscated; outer tarsal segments black. Wings whitish subhyaline, conspicuously banded with dark brown, the light and dark color subequal in amount; cells *C* and *Sc* chiefly darkened, variegated by small ground spots, the largest at end of vein *Sc;* three major oblique dark bands, the first from the origin of *Rs* to the axillary region, second over the cord, entirely crossing the wing, third band from end of vein R_1 across the outer end of cell *1st* M_2; last band continued to the wing tip in cells R_3 and R_4, with slight invasions of cells R_2 and R_5; small dark marginal spots at ends of veins M_1 and M_2; darkened bands on posterior half of wing variegated by grayish spots; the major ground areas include a circular spot across *Rs,* separated from a larger mark in the anal cells by a dark seam over vein *Cu;* largest ground band extends unbroken from R_1 to the posterior margin, nearly parallel sided; pale areas in outer radial cells small, those in medial field larger; veins yellow, slighty darker in the patterned areas. Venation: As in other Asiatic species of the genus but differing conspicuously in the medial field, cell *1st* M_2 being strongly expanded at outer end, with vein M_2 deflected caudad so cell *2nd* M_2 at margin is very extensive, approximately four times cell M_3; in other regional species the two cells are more nearly equal in extent, least so in *yankovskyi* where cell M_2 is about twice cell M_3; cell M_4 similarly very extensive at margin, cell *Cu* very narrow.

Abdomen brownish gray, densely freckled with small brownish black spots, the setae yellow. Ovipositor small.

Habitat: North India (Uttar Pradesh).

Holotype: ♀, Loharket, Almora, 5770 feet, September 19, 1958 (Fernand Schmid).

This striking fly is named for the collector, Dr. Fernand Schmid, who has added vastly to our knowledge of the crane-flies of Almora and Garhwal. It is quite distinct from the four species of the genus hitherto made known from Asia, *Protanyderus alexanderi* Kariya, *P. esakii* Alexander, *P. beckeri* (Riedel) and *P. yankovskyi* Alexander, all from the Palaearctic region. The present is the first record of the family from India or from the entire Oriental region. The most recent key to the Asiatic species of the Tanyderidae is by Peus.[2]

Araucoderus gloriosus (Alexander)

Tanyderus gloriosus Alexander; Arkiv för Zoologi, 13, no. 7: 5–7, fig. (wing); 1920.

The type was from the Rio Aysén, South Chile, collected by Per Dusén. The fly is herewith recorded from Argentina: Cerro Chapelco, Territory of Neuquen, altitude 1700 meters, December 28, 1951 (S. Schachovskoy); metatype ♀.

PTYCHOPTERIDAE

Ptychoptera osceola, n. sp.

Size small (wing 6 to 8 mm.); mesonotal praescutum and scutum black, the former reddened anteriorly; scutellum, postnotum and pleura uniformly orange to yellow; antennae of male long, exceeding the wing; femora and tibiae yellow, tips not darkened; abdomen chiefly yellow, the posterior border of third tergite broadly blackened, the outer segments more or less darkened; male hypopygium with the seminal vesicle relatively small, median sternal appendage large and membranous.

Male: Length about 6.5–8 mm.; wing 6–8 mm.; antenna about 4.5–5 mm.

Female: Length about 8 mm.; wing 7 mm.; antenna about 2 mm.

Rostrum light yellow; palpi testaceous yellow. Antennae of male elongate, as shown by the measurements, about two-thirds the wing; basal three segments light brown, the remainder of flagellum black, flagellar segments elongate-cylindrical, verticils short and inconspicuous; antennae of female much shorter, scape brownish yellow, pedicel clear yellow, flagellum black. Head polished black.

Pronotum yellow. Mesonotal praescutum and scutum black, the anterior central third of the former reddened, in cases the color even more extensive; scutellum and postnotum reddish orange. Pleura uniformly yellow. Halters infuscated. Legs with coxae and trochanters yellow; femora, tibiae and basitarsi obscure yellow, the tips not darkened; outer tarsal segments black. Wings with the discal interspaces whitened, the apex and anal cells

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[2] Peus, Fritz. Tanyderidae and Liriopeidae, in Lindner's Die Fliegen der Palaearktischen Region, Lieferung 200: 1–44, 67 figs.; 1958.

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slightly more darkened; three incomplete brown bands, the largest and outermost at cord, narrowed behind, extending about to the basal third of the last section of vein Cu_1; second band in cells *R* and *M*; basal area very short, at arculus; isolated brown spots over each of the outer forks, the posterior one smaller; costal border more uniformly pale brown; wing tip appearing weakly darkened because of the abundant macrotrichia; veins brown. Macrotrichia of outer cells involving about the outer half of the area beyond the cord. Venation: *r–m* before the fork of *Rs*, its position slightly variable.

Abdomen of male chiefly yellow, the third tergite with posterior border broadly blackened; outer segments more orange yellow, the fifth and sixth in cases more darkened; in the female the intermediate tergites with narrow blackened borders. Male hypopygium with the posterior border of the ninth tergite broadly emarginate, the lateral lobes relatively slender, tips narrowly obtuse. Dististyle with the inner apical lobe produced into a more or less distinct blackened point. Seminal vesicle relatively small, as compared with *rufocincta*. Median sternal appendage large and membranous, especially on the dorsal part.

Habitat: Florida.

Holotype: ♂, Gainesville, Alachua County, May 2, 1930 (J. Speed Rogers); Rogers No. 273. *Allotopotype:* ♀, July 4, 1929 (Rogers); Rogers No. 268. *Paratopotypes:* Numerous males and some females, all collected by Rogers on the following dates and bearing his collection numbers—No. 26, March 12, 1922; No. 58, February 11, 1923; No. 206, July 25, 1926; No. 207, July 26, 1926; No. 209, November 7, 1926; No. 211, November 25, 1926; No. 255, March 7, 1929; No. 259, April 20, 1929; No. 263, May 4, 1929; No. 635, May 1929, in sphagnum bog, reared; No. 651, March 10, 1930. *Paratypes:* 2 ♂♂ (one mounted on slide), Welaka, Putnam County, April 11, 1947 (R. E. Bellamy); No. 2566. Full data covering the various numbers are in the Rogers Collection, University of Michigan, where the types and majority of the paratypes are placed.

The present fly has been confused with the more northern *Ptychoptera rufocincta* Osten Sacken but appears certainly to be distinct in the diagnostic characters listed above. As has been indicated in other papers, it is virtually certain that the earlier described *P. quadrifasciata* Say is the same as *rufocincta* but in the absence of the type of the former it seems advisable to retain the name *rufocincta,* which has been in constant use since its original description.

Ptychoptera garhwalensis, n. sp.

Entire body black, the surface chiefly nitidous; legs brown, tarsi black; wings tinged with brownish yellow, unpatterned; *Rs* relatively short, arcuated, longer than *r–m;* male hypopygium with the lateral tergal lobes large, decurved; dististyle with a strong tooth on mesal face at near midlength.

Male: Length about 9 mm.; wing 9 mm.; antenna about 5.1 mm.

Rostrum reddish brown, slightly darkened at tip; mouthparts obscure orange; palpi with basal segment reddish brown, remainder brownish black. Antennae black, apex of pedicel light brown; relatively long, exceeding one-half the wing; flagellar segments cylindrical, exceding in length the short verticils and short dense white pubescence. Head black, surface subopaque by a vague bloom.

Pronotum black. Mesonotum black, surface nitidous or virtually so, variegated by restricted reddish areas on the pretergite opposite the humeri, in region of the wing insertion, the parascutella and along the postnotal suture. Pleura black, in places more pruinose, especially on the mesepimeron. Halteres obscure yellow, clearer at base. Legs with fore and middle coxae reddish brown, vaguely pruinose behind, posterior coxae black, heavily pruinose; trochanters obscure yellow; femora light brown basally, passing into dark brown; tibiae light brown, tips darker; tarsi black. Wings tinged with brownish yellow, the prearcular and costal regions and the narrow space between the cubital branches more saturated yellow; veins dark brown, paler in the brightened areas, especially *Sc*. Macrotrichia in all cells beyond cord except cell R_1 and bases of the remaining cells; basad of cord with macrotrichia in centers of cells *R* and *Cu*. Venation: *Rs* relatively short, arcuated, longer than *r–m* which lies at its fork; cell M_1 small.

Abdomen black throughout, surface subnitidous. Male hypopygium large, the ninth tergite viewed from above with broad lateral lobes, their tips obliquely truncated, separated by a U-shaped notch, on sides of which is a pair of small forked lobules; median tergal lobe slender, with abundant setae; viewed from the side the lateral lobes appear further notched, the large ventral part dilated outwardly. Dististyle an elongate obscure yellow rod, its mesal face with a rounded basal lobe near base and a triangular darkened tooth at near midlength. Lobes of ninth sternite appearing as paired flattened dusky spatulate blades, clothed with long pale setae. Posterior border of eighth sternite produced caudad into a broad depressed lobe.

Habitat: North India (Uttar Pradesh).

Holotype: ♂, Manghu Chatti, Pauri Garhwal, 9000–9270 feet, May 20, 1958 (Fernand Schmid).

The present fly is readily told from all other regional members of the genus by the almost uniformly black color of the body, the venation of the radial field, and by the structure of the male hypopygium. By my key to the Himalayan species of the genus,[3] the fly disagrees with all known species in the venation, being somewhat closer to *Ptychoptera ichneumonoidea* Alexander, of northeastern Burma.

TRICHOCERIDAE

Trichocera ursa-major, n. sp.

Readily told from all previously described species by the unusual structure of the male hypopygium, particularly the dististyle.

Male: Wing about 7 mm.

Wings faintly tinged with brown, stigmal darkening not evident; veins light brown. Macrotrichia of veins relatively short, on all veins except near wing base. Venation: Petiole of cell M_1 about twice *m*; *m–cu* near outer end of cell *1st* M_2; vein *2nd A* curved gently into margin, the cell almost parallel-sided.

Male hypopygium large, including the tergite which is narrowed outwardly, the posterior border with a broad shallow emargination, the lateral angles slightly produced, each bearing a single fasciculate bristle. Basistyle short and stout. Dististyle unique in structure, very large, three-branched; longest branch gradually enlarged outwardly, irregularly trilobed at apex, the lateral lobe with a dense brush of long yellow setae, inner lobe small, with shorter setae, intermediate lobe pale, with stiff scattered setae; intermediate branch short and stout, extended into two lobules, one a flattened blade, the other shorter, more or less truncated at tip; inner branch short, obtuse and dilated at tip. Gonapophyses short and stout, divergent.

Habitat: Canadian Northwest Territories.

Holotype: ♂, wing and hypopygium on microscope slide, Great Bear Lake, July 9, 1948; Rogers Collection, University of Michigan, study specimen 4614. The remainder of the type was unavailable at time of description.

Compared with other species of the genus with unusually modified male hypopygia the present fly is quite distinct in the structure of the dististyle and ninth tergite. Such forms with large and complex genitalia include, among others, *Trichocera colei* Alexander, *T. forcipula* Nielsen, *T. lutea* Becher, *T. mirabilis* Alexander and *T. salmani* Alexander.

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[3] Alexander, Charles P. Arkiv för Zoologi, 38 A, no. 2: 1–3; 1946.

DIXIDAE

Dixa amabilis, n. sp.

General coloration of thorax brownish yellow, the anterior praescutal stripes almost concolorous with the ground; femora yellow, tips abruptly black, tibiae and tarsi black; wings whitish subhyaline, heavily patterned with light brown, more heavily so on anterior half of wing, the pale and brown areas subequal in extent.

Female: Length about 4.5 mm.; wing 3.8 mm.

Rostrum dark brown, relatively long, about three-fourths the remainder of head; palpi black. Antennae with scape and pedicel obscure brownish yellow, flagellum black, extreme bases of the proximal four segments whitened. Head above light brown, silvery pruinose.

Pronotum testaceous yellow. Mesonotal praescutum and scutum pale, with three brownish yellow stripes that are best delimited from the ground by narrow reddish brown margins, the interspaces more silvery pruinose; a reddish brown U-shaped area on side of praescutum; scutellum testaceous yellow, darker beneath; postnotum light brown. Pleura chestnut brown, propleura more yellowed. Halteres broken. Legs with coxae and trochanters yellow; femora yellow, the tips abruptly black, involving about the outer fifth of the segment; remainder of legs black; posterior tibiae slightly dilated on outer margin before apex. Wings whitish subhyaline, heavily patterned with light brown, the two colors subequal in extent; cells C and Sc yellowed; the major dark areas are on the anterior half of wing, including about six marks, the two in cell R extending from vein R backward, subequal to the interspaces; areas at cord and stigma confluent behind, forming a Y-shaped mark over the anterior cord; outer two costal darkenings in cell R_2, confluent behind in cells R_4 and R_5, the latter isolating an apical ground area in cells R_3 to R_5; on posterior half of wing the dark areas are smaller and paler, including large clouds in cells Cu and A; veins yellow, slightly darker in the patterned areas. Macrotrichia on outer veins, including almost the outer half of Anal vein. Venation: Rs straight, oblique, in virtual alignment with the basal section of R_5; cell M_1 relatively short.

Abdomen brownish yellow, vaguely more brightened on the more proximal segments. Ovipositor with cerci elongate, straight.

Habitat: North India (Uttar Pradesh).

Holotype: ♀, Teri, Teri Garhwal, 2500–5000 feet, April 19, 1958 (Fernand Schmid).

Dixa amabilis is most similar to *Dixa guttipennis* Thomson and *D. maculipennis* Brunetti, differing from both and from all other described regional species by the coloration of the legs and by the unusually heavy wing pattern.

THE GENUS NEOKOLLA (HOMOPTERA, CICADELLIDAE)

By Dwight M. DeLong and Neva L. Currie[1]

The genus *Neokolla* was erected by Melichar[2] in 1926. China[3] in 1938 designated the type as *Tettigonia heiroglyphica* Say.

The major characteristics of the genus are: Head as wide as or wider than pronotum, anterior margin rounded or bluntly subangular; crown broad, median length greater than length next eye. Pronotum broad, lateral margins short and carinate, disk transversely striated. Forewing with central anteapical cell parallel sided, inner anteapical cell closed but short, first apical cell long and membranous. Female seventh sternite with posterior margin usually angularly produced. Male plates elongate, triangular. Connective T-shaped, shaft short. Aedeagus symmetrical, compressed; base of aedeagus usually broad with a pair of basal processes extending along the shaft.

Three species have been placed in the Nearctic fauna. Two of these are southwestern in distribution and one of them was described partially from Mexican material. Five others which have been collected in Mexico and show relationship to *aridella* are being described at this time.

All types are in the DeLong collection unless otherwise designated.

Neokolla heiroglyphica (Say)

Tettigonia heiroglyphica Say, J. Acad. Nat. Sci. Phila. 6: 313, 1830
Tettigonia gothica Signoret, Anns. Ent. Soc. Fr. 2: 345, 1854
Tettigonia similis Woodworth, Bul. Ill. St. Lab. Nat. Hist. 3: 25, 1890

The crown of *heiroglyphica* is bluntly produced, about three fourths as long at the middle as the basal width between the eyes. Length 5.5 to 6.5 mm.

Color yellowish to gray, often reddish, with black markings on the basal half of the crown in the form of two "horseshoes" with the open end basally. There is a black spot at apex and a black line either side enclosing the reflexed portions. A black line extends from the inner end of the suture posterior to the arcs through the ocellus to the base.

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[1] Department of Zoology and Entomology, Ohio State University
[2] Anns. Mus. Nat. Hungarici 23: 343, 1926
[3] Anns. Mag. Nat. Hist. 11th ser. 2: 182, 1938

The female posterior margin of the seventh sternite is angularly produced. Male plates elongate, tapering to pointed apices. The style is long, scarcely narrowed at apex and bluntly rounded. The aedeagus consists of an erect caudal portion which is broad in lateral view with a sharp pointed erect spine-like structure on either side at about the middle; it is as long as the broad portion and proximal to it on each side. The cephalad portion is composed of a pair of broad structures which are some distance apart.

This is the common eastern form and extends west of the Mississippi River, probably to the Rocky Mountains in certain states.

The larger size and internal genital structures will easily separate it from the western species.

Neokolla pusilla, n. sp.

Resembling *heiroglyphica* in form and appearance but smaller and with distinct male genital structures. Length of male 5 mm.

Crown appearing rather well produced and bluntly angled, about a third wider between eyes at middle than median length.

Color similar to *heiroglyphica.* Crown pale with the same pattern of dark markings as in *heiroglyphica,* with a narrow V-shaped dark marking either side of a pair of proximal median longitudinal lines. The V-shaped markings extend almost to the base of the head. Pronotum with anterior and lateral margins broadly pale. The discal and posterior portions are darker with pale mottling. Scutellum pale, with a dark angular line extending across each basal angle. Fore wings dark with pale mottling.

Male plates long, gradually tapered to bluntly pointed apices which curve outwardly. Styles gradually narrowed at half their length to bluntly pointed apices, which are bent inwardly. The aedeagus is divided dorsoventrally on the apical half. In lateral view it appears rather short and broad with a narrow basal spur which extends dorsally. A pair of dorsal pygofer spines extend from base of pygofer to half its length and form narrow spine-like hooks at the tips which curve inwardly.

Holotype male collected at Ixmiquilpan, Hidalgo, Mexico, September 27, 1941, by D. M. DeLong, E. E. Good, and J. S. Caldwell.

Neokolla mesolinea, n. sp.

Resembling *heiroglyphica* in form and size but with a median dark conspicuous line on crown and with distinct male genitalia. Length of male 4.75 mm., female 5.25 mm.

Crown produced and bluntly angled, a little wider between eyes than median length.

Color: Crown pale yellow marked with pale and dark brown. The dark markings are a spot at apex and a conspicuous median longitudinal stripe on basal two-thirds which is broadened at the anterior end to form a spot just anterior to the disk. The paler markings are variable. Usually a paler longitudinal spot extending from apex caudad, a diagonal elongate spot either side of middle at base, a broken line just above vertex margin between apex and each eye. Three broken concentric arc-like lines are on each side of apex above the margin. Pronotum pale, straw color with a pale brown mottling, Scutellum pale with a dark spot in each basal angle. Fore wings with a dark brown stripe along basal half of claval vein, interrupted at about the middle by a paler area. Claval portion paler than costal area, giving the dorsal portion a zigzag longitudinal pale saddle area.

Female seventh sternite with the posterior margin truncate at apex or slightly emarginate. Male plates long and narrow gradually tapered to narrow, blunt apices. Styles abroad at base, apical third sickle-shaped with the apices pointed and curved outwardly. Aedeagus with a basal portion which is erect and bears a pair of short dorsal processes. A pair of long slender processes arise on the caudal side at the base and curve upward and caudally to the terminus of the pygofer. In ventral view they appear to curve outwardly from the base converging at their apices.

Holotype male, allotype female and male and female paratypes collected at Caropan, Michoacan, Mexico, near Kilometer 432, October 2, 1941, by DeLong, Good, Caldwell, and Plummer. Female paratypes from Zacapu Michoacan, Mexico, October 4, 1941, collected by the same collectors; Toluca Rd., Mexico, collected November 24, 1938, by J. S. Caldwell. Male paratypes collected at Mexico City, D. F., Mexico, on the Toluca Rd., Sept. 26, 1945, by DeLong, Elliott and Hershberger.

Neokolla lurida, n. sp.

Resembling *heiroglyphica* in form and general appearance but with paler coloration and distinct male genital structures. Length of male 5 mm., female 5.5 mm.

Crown rather strongly produced, about one fifth wider between eyes than median length.

Color: Crown pale yellowish or greenish with pale brownish markings. A black spot at apex and a black line next each ocellus. The color pattern of *heiroglyphica* on vertex is faint and marked with pale brown, especially the two proximal longitudinal lines on the base of the vertex and the transverse marks on the disk anterior to the ocelli. The areas either side of apex are pale brown. Pronotum pale on anterior and lateral margins with pale brownish markings, disk and posterior portion dark gray to green. Fore wings pale brownish with light mottling, claval vein paler.

Female seventh sternite with posterior margin roundedly produced, male plates long, tapered to narrow, proximal, pointed apices. Styles short, rather broad, narrowed on the apical fourth to narrow blunt apices which are directed inwardly. Aedeagus simple, U-shaped with the caudal portion longer than the cephalad arm.

Holotype male collected at Chilpancingo, Guerrero, Mexico, Sept. 10, 1939, by DeLong and Plummer. Allotype female and paratype female collected at Taxco, Guerrero, Mexico, Sept. 9, 1939, by DeLong and Plummer. Female paratype collected at Uruapan, Michoacan, Mexico, October 1, 1941, by DeLong, Good, Plummer and Caldwell.

Neokolla severini DeLong

Neokolla severini DeLong, Pan. Pac. Ent. 24: 142, 1948

In form and coloration resembling *heiroglyphica* but smaller, and with a blunter head and with distinct genital structures. Length 5.5 to 6 mm.

Crown produced and bluntly angled, almost one third wider between the eyes than the median length.

Color similar to that of *heiroglyphica*. The crown ground color is grayish often tinted with reddish. There is a black spot at the apex. On each margin, about half way between the apex and the eye, there is an area separated from the disk by a black line; it encloses several dark arc-like lines. A black line extends from the inner basal margin of this area to the ocellus which is enclosed in a black ring. A black line extends forward from the ocellus, curves on the disk to meet the curved line from the opposite side, from which point both are directed basally for a short distance as contiguous lines. There is also a black dash near the base on either side between the ocellus and the eye. The anterior third of the pronotum is pale with black markings. The posterior two thirds is black. The scutellum is gray, often tinted with red, with black lines extending from either side at about the middle to the pronotum. The elytra are usually dark with a few pale markings and the veins are inconspicuous, often obscured. The face is pale with traces of faint arcs.

The posterior margin of the female seventh sternite is strongly angularly produced to a blunt apex. Male plates elongate, concavely narrowed on the inner margins to form narrow rather blunt apices. Plates about four times as long as the width of each at base. Styles rather short, broad at base and curved inwardly to form a blunt apex, Aedeagus simple; in ventral view the apex appears slightly enlarged and notched at middle forming two rounded apical lobes. At the base is a pair of dorsally directed processes.

This species is western in distribution, originally described from Larkmeade, California, and several localities in central and southern Arizona. Many records are at hand from Arizona and two specimens referred to this species were collected at Laramie, Wyoming, in July.

Neokolla severini **hamula,** n. subsp.

Resembling *severini* in form, color, size and general structural characters but with conspicuous curved pygofer hooks on the middle dorsal portion of the pygofers.

In specimens of *severini* there is an indication of a small dorsal caudal spur but in *hamula* this is present as a curved pygofer hook.

There seem to be no intermediate forms. It is, therefore, designated as a subspecies of *severini.*

Holotype male and paratype male collected at Huachuca Mts., Arizona, July 28, 1907. Male paratypes from Congress Jct., Arizona, June 14, 1937, and from Baboquivari Mts., Arizona, July 10, 1937, both collected by D. J. and J. N. Knull.

Neokolla aridella DeLong

Neokolla aridella DeLong, Pan. Pac. Ent. 24: 144, 1948

Resembling *heiroglyphica* in form and appearance, but a little smaller and with distinct male genital structures. Male 5 mm.; female 5.5 mm.

Crown bluntly angularly produced, about two thirds as long at middle as the basal width between the eyes.

Color: Crown, anterior portion of pronotum, and scutellum tawny marked with black; posterior portion of pronotum and elytra gray. The vertex has a black spot at the apex surrounded by a pale ring, the reflexed portion is heavily marked with black and a black line extends from the inner end of the impressed groove through the ocellus to base. The two loops or "horseshoes" usually found on the basal portion are fused on the inner margin so as to form a median black longitudinal line on the basal two thirds. The anterior portion of the pronotum is rather heavily marked with black. The scutellum appears mostly black, with tawny margins, a few spots at base and a conspicuous median apical spot on posterior half. Elytra dark gray with pale veins on apical portion. Face black with white mottling.

The posterior margin of the seventh sternite of the female is strongly produced, sloping on each side to form a blunt angle at apex. The male plates are long, concavely tapered on outer margin to form narrow, pointed apices. The styles are rather short and the apices are bluntly pointed. The aedeagus is composed of a pair of long blade-like processes that extend caudally. These are well separated and are sharply pointed. At the base of these structures is a pair of erect processes which are shorter and extend dorsally. Between these is a single median process which extends dorsally and slightly caudally and appears to attach to the margin of the tube.

This species was originally described from specimens collected in the Chiricahua Mts., Arizona, and in Tasquillo, Hidalgo, Mexico. Many records are at hand from Mexico including Mexico City, D. F., and on the Toluca Road west of Mexico City.

Neokolla remina, n. sp.

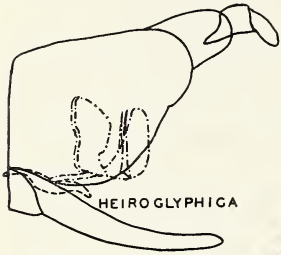
Closely related to *aridella* but with a blunter head and distinct male genital structures. Length of male 5.5 mm.

Crown bluntly angled, almost one-third wider between eyes at base than median length.

Color: Crown pale yellow, a dark spot at apex, a heavy dark circle enclosing a large yellow area about equidistant between apex and eye on either side and extending down over margin. A pair of dark proximal median longitudinal lines on disk, the anterior ends of which curve outwardly and caudally and terminate just medially to the ocelli. There is a dark marking at the basal inside margin of each eye and a black curved marking from each ocellus to base which then curves forward to the median line. Pronotum pale on basal and lateral third with vermiculate dark markings. Basal portion dark, slightly mottled. Fore wings dark, smoky subhyaline, without regular pale markings in male; in female, posterior half of pronotum and fore wings green with darker veins.

Female seventh sternite with posterior margin pointedly produced. Male plates long, apices narrowed and produced as slender tips. Styles rather short narrowed at about half their length, curved inwardly and caudally with pointed apices. Aedeagus with a ventral basal process which extends caudally. Two ventral and two dorsal processes arise at base. The ventral processes extend caudally and outwardly on each side of the ventral process. The two dorsal processes are stouter and extend dorsocaudally and outwardly.

DeLong and Currie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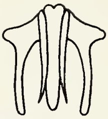
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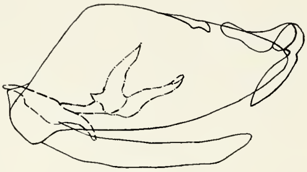
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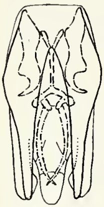
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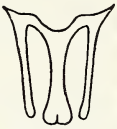
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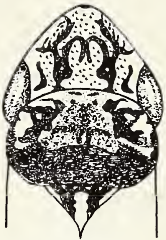
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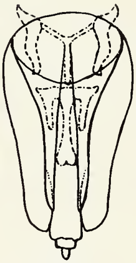
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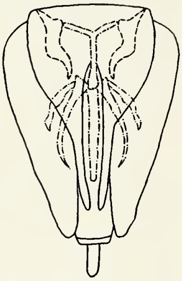
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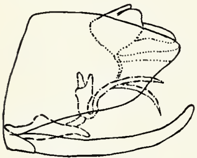
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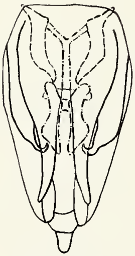
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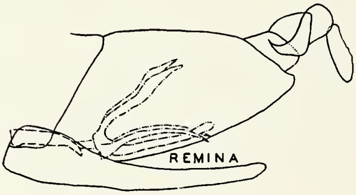
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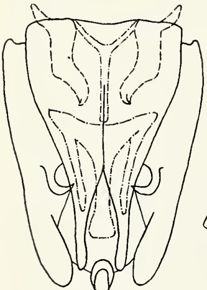
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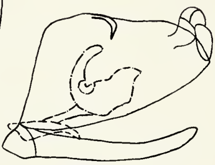
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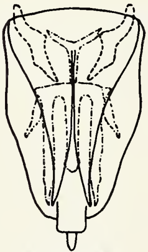
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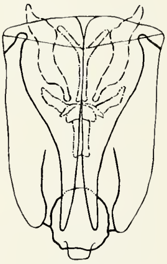
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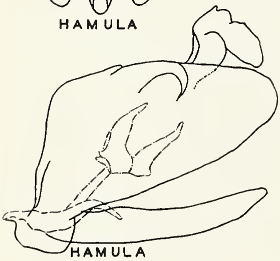
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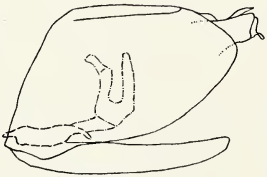
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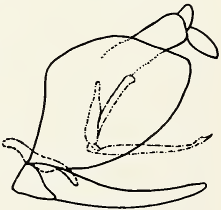
ARIDELLA

Holotype male, allotype female and paratype male and females collected at Rio Tuxpan, Michoacan, Mexico, Sept. 25, 1945, by DeLong, Plummer, Hershberger and Elliott. Male and female paratypes collected at Mexico City, D. F., Mexico, 18 Km west, September 1, 1939, by DeLong and on the Toluca Road between Mexico City and Toluca, Nov. 24, 1938, by J. S. Caldwell.

SOME NEW RECORDS OF CARIBBEAN COLLEMBOLA

By David L. Wray[1]

The study of the distribution of Collembola has excited zoogeographers because of their diverse habitats and climatic requirements. Hence, it was with extreme interest that I examined several collections of Collembola from Central America and the West Indies that were sent me for identification.

The following are new distribution records for some Caribbean Collembola extending their ranges. Some species were found in southern Florida while some were from Central American areas, which is to be expected with the Collembolan fauna of this region.

Subfamily Entomobryinae Schaffer, 1896

Entomobrya cubensis Folsom, 1927

This species was originally described from specimens taken from sugar cane and pineapples from Cuba. Three new records are as follows: Panama—August 20, 1958, taken from soil around the roots of miscellaneous plants at port of entry by A. S. Miller; Florida—Daytona Beach, September 2, 1958, taken on *Viburnum adoratissimum* by C. R. Roberts and G. D. Bridges; Miami, March 28, 1957, collected on *Ananas comosus* from Cuba by W. T. Rowan.

Drepanocyrtus dowlingi Wray, 1953

Described from Republica Dominicana from specimens taken from Bermuda grass and in debris under boards. I have identified specimens from: Panama—July 22, 1958, taken from plants (*Epidendrum* spp.) originating in this country; Puerto Rico—San Juan, May 19, 1958, on yams, intercepted at port of entry by C. L. Brians.

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[1] Division of Entomology Insect Survey, N. C. Dept. of Agriculture, Raleigh, N. C.

Salina wolcotti Folsom, 1927

Described from Puerto Rico by J. W. Folsom from specimens collected on corn, on the ground, on canna and water hyacinth, on cane, and on cotton leaves. New records are: Florida—Fort Lauderdale, July 22, 1958, collected on *Ficus exotica* by J. M. Soowal; Miami, September 20, 1957, sweeping palms, crotons, arbor vitae, and other plants, L. J. Daigle and C. E. Bingaman; Tampa, September 30, 1957, collected on *Cornus florida* by Soowal; Dania, October 9, 1957, collected on *Sanchezia* foliage by Soowal; St. Petersburg, October 31, 1957, collected on *Hibiscus* by Bingaman and Miller. Central America—Turrialba, November 12, 1956, collected from *Cacao* by J. E. Casida.

Subfamily Paronellinae Börner, 1906

Dicranocentrella marias Wray, 1953

This species was first described from Puerto Rico from specimens taken in litter. A new record is from Guatemala. I have identified specimens taken from orchid plants coming from that country as this species.

LITERATURE CITED

Folsom, P. W. 1927. Insects of the subclass Apterygota from Central America and the West Indies. Proc. U. S. Nat. Mus. 72 (6): 1–16, 8 pls.

Wray, D. L. 1953. Some new species of springtail insects (Collembola). Nature Notes, Occ, Papers, No. I, pp. 1–8, 2 pls.

Wray, D. L. 1953. New Collembola from Puerto Rico. J. Agric., Univ. of Puerto Rico 37 (2): 140–150, 2 pls.

PUBLICATIONS RECEIVED

Guide to the Insects of Connecticut. Part VI. The Diptera or True Flies of Connecticut. Sixth Fascicle: March Flies and Gall-Midges. Bibionidae by D. E. Hardy, and Itonididae by A. E. Pritchard and E. P. Felt with revisions by C. L. and J. E. Remington. 1958. Conn. State Geol. and Nat. Hist. Surv. Bul. 87: 230 pp., 15 pls.

THE GENUS ANISEPYRIS IN THE GREATER ANTILLES (HYMENOPTERA, BETHYLIDAE)

By Howard E. Evans, Cornell Univ., Ithaca, N. Y.

In the course of preparing a revision of the Nearctic species of *Anisepyris* I examined 35 specimens of this genus from the Greater Antilles. It is of course impossible to revise the group in a definitive manner on so little material, especially when the types of most of the species are not available to me. I would like, however, to present a few preliminary notes on the species occurring in the Greater Antilles, as there appear to be several new species as well as some unrecognized synonymy.

The West Indian fauna of *Anisepyris* is remarkable in that all the species are brilliantly colored with various shades of green, the green in some species being combined with blue-green, red, and black. In spite of this, the species are relatively conservative in structure, although the mandibles do show an unusual amount of interspecific variation. Two well-defined species groups are present. One group, which I have called the *excisus* group, includes three West Indian species plus the southeastern U. S. species *analis* (Cresson). The other group of three West Indian species may not be unrelated to the North American *occidentalis* group, which includes several species with metallic coloration.

Terminology and abbreviations employed are the same as those used in the writer's revision of the Nearctic species (Proc. Ent. Soc. Washington, in press).

Key to Greater Antillean Species of Anisepyris

Females

1. Mandibles with five teeth; propodeum with five discal carinae; antennal scrobes not margined above by a carina; front wide, at least 1.2 times as wide as the eye height (*aurichalceus* group) 2

   Mandibles with four teeth, the innermost tooth broad and blade-like; propodeum with seven discal carinae; antennal scrobes margined above by carinae; front narrow, not more than 1.1 times the eye height (*excisus* group) 4

2. Basal parts of legs dark brown, tibiae and tarsi light brown; wing veins and stigma light brown, the membrane faintly tinged with brown; distance from top of eyes to vertex crest much less than eye height ...... *wolcotti,* new species

   Legs (except front coxae) rufous; wing veins and stigma dark brown, the membrane distinctly brownish (paler apically); distance from top of eye to vertex crest nearly as great as eye height 3

3. Head and thoracic dorsum with strong golden reflections; lateral carinae of pronotum strong; punctures of front relatively weak; length about 5 mm. . *aurichalceus* (Westwood)

Head and thorax brilliant, shining green, with weak golden reflections if any; lateral carinae of pronotum obsolescent in most specimens; punctures of front very strong; length 4.5–7 mm. . . . . *viridellus* Kieffer

4. Head and thoracic dorsum brilliant green; mandibles with a deep excision between the basal tooth and the apical three teeth; head considerably wider than high (transfacial line about 1.1 times vertical facial line) . . . . *excisus,* new species

Head and thorax a less brilliant green, the head, at least, with golden reflections; mandibles without a deep excision as above; head slightly if at all wider than high (transfacial line .98–1.05 times vertical facial line) 5

5. Front with a strong median impression which reaches two-thirds the ditsance to the anterior ocellus; propodeum blue-green; thorax with strong golden reflections dorsally; wings brownish . . . . *planiceps* (Fabricius)

Front with the median impression weak, short, linear, propodeum black; wings faintly tinged with brownish; golden reflections mostly confined to the head
darlingtoni, new species

Males

1. Propodeum with seven discal carinae; legs pale reddish-brown; head and thorax greenish, the head with golden reflections . . . . *darlingtoni,* new species

Propodeum with five discal carinae; legs either fuscous or wholly bright rufous 2

2. Head and thorax bright green; legs bright rufous
viridellus Kieffer

Head and thorax with weak metallic reflections; legs fuscous, except the tarsi reddish . . . . *rufitarsis* Kieffer

Anisepyris aurichalceus (Westwood)

Epyris aurichalceus Westwood, 1874, Thesaurus Ent. Oxoniensis, pp. 160–161, pl. 31, fig. 3 (♀, Cuba).

Anisepyris aureus Kieffer, 1910, Ann. Soc. Ent. France 79: 38–39 (♀, Havana, Cuba, Baker).—Kieffer, 1914, Das Tierreich 41: 438–439. *New synonymy.*

A careful comparison of the descriptions of *aurichalceus* and *aureus* reveals only one point of disagreement: the mandibles of *aurichalceus* are said to be 5-toothed, while those of *aureus* are said to be 4-toothed, the inferior tooth large. A topotypic paratype of *aureus* in the collection of Cornell University agrees nearly perfectly with Kieffer's description, but the mandibles (when relaxed, cleaned, and extended) are seen to be 5-toothed, the basal three teeth somewhat blunt but nevertheless clearly separated. Errors of a similar nature are known to be common in Kieffer's descriptions, and I am inclined to accept this specimen as indeed representing Kieffer's *aureus,* which thus falls in the synonymy of Westwood's *aurichalceus.*

Specimens seen: CUBA: 1 ♀, Havana (C. F. Baker) [CU].

Anisepyris viridellus Kieffer

Anisepyris viridis Kieffer, 1907, Ann. Soc. Sci. Bruxelles 32: 12–13 (♂, Havana, Cuba).—Kieffer, 1910, Ann. Soc. Ent. France 79: 39 (♀, Havana, Cuba, Baker). Preoccupied by Cameron, 1888.

Anisepyris viridellus Kieffer, 1914, Das Tierreich 41: 438. *New name.*

Anisepyris cubensis Fouts, 1928, Proc. Ent. Soc. Wash. 30: 125–126 (♀, Nagua, Oriente, Cuba, July 7, 1922, S. C. Bruner & C. H. Ballou; type USNM no. 41219). *New synonymy.*

This striking and easily recognized species appears to be one of the more common members of the genus within its range. Fouts did not compare his *cubensis* with any of the previously described Cuban species, but it seems to agree in all particulars with Kieffer's *viridellus.* Although Kieffer was familiar with both sexes of this species from Cuba, the only males I have seen are from Puerto Rico. These males agree well enough with Cuban females and with Kieffer's description of the male. However, I have seen no females from Puerto Rico and no specimens of either sex from the intervening island of Haiti. Since the Puerto Rican specimens are from a military base, the possibility of an introduction must be considered.

Specimens seen: CUBA: 5 ♀♀, Jalibonico, July 16, 1929, on leaves of *Terminalia* sp. (L. C. Scaramuzza) [MCZ]; 3 ♀♀, Las Calabazas, Holguin, June 1933 (G. C. Aguayo) [MCZ]; 3 ♀♀, Guantanamo [ANSP, MCZ]; 3 ♀♀, Soledad, Santa Clara, March–June [AMNH, MCZ]; 1 ♀, 4 km. from Camaguey, June 19, 1950, on leaves of *Citrus sinensis* [USNM]; 1 ♀, Pico Turquino, June 1936, 6000 feet (P. J. Darlington) [MCZ]; 1 ♀, Buenos Aires, Trinidad Mts., May 1936, 2500 feet (Darlington) [MCZ]; 1 ♀, Sierra Rangel, Aug. 1929 (J. Acuña & S. C. Bruner) [MCZ]; 1 ♀, Santiago de las Vegas, near Havana [MCZ]. PUERTO RICO: 3 ♂♂, Raney Base, Aguadilla, May 4, 1958 [USNM].

Fouts (1928) records the species from Nagua, Pico Turquino, and Sierra Maestra, 3000–3500 feet, all in Cuba.

Anisepyris wolcotti, n. sp.

Female: Length 4–5 mm.; length of fore wing 3.0–3.4 mm. Head and thorax green, the thoracic dorsum with weak coppery reflections; propodeum green or blue-green; abdomen black, the apical two or three segments suffused with rufous; mandibles and antennae dusky ferruginous, the flagellum paler ventrally; tegulae testaceous; basal parts of legs dark brown, the outer side of the front femora weakly reflecting green, tibiae and tarsi light brown. Fore wing with veins and stigma brown, membrane uniformly tinged with light brown.

Mandibles with five teeth, the basal three broad, blunt, and rather weakly separated. Antennal scrobes not margined above by carinae. Front strongly shining, with strong punctures which are separated from one another by from 1.0 to 1.5 times their own diameters. Middle interocular line .63 times transfacial line, 1.25 to 1.32 times eye height; ocello-ocular line 1.25 to 1.35 times width of ocellar triangle; distance from top of eyes to vertex crest equal to slightly more than half the eye height. Pronotal disc shining, with sparse, strong punctures; mesoscutum less strongly shining and with smaller punctures. Propodeal disc with five carinae, transversely striate between the carinae, the postero-lateral portions smooth and somewhat shining; posterior face of propodeum with the ridges strongly curved upward medially, obsolete toward the top. Middle tibiae moderately spinose above.

Holotype: ♀, Port au Prince, Haiti, May 1925 (G. N. Wolcott) [USNM]. *Paratypes:* 1 ♀, same data as type [USNM]; 1 ♀, La Moriniere, Haiti, March 1922, alt. about 125 feet [AMNH].

Anisepyris excisus, n. sp.

Female: Length 5.5–7.0 mm.; length of fore wing 3.7–4.1 mm. Head and thorax a brilliant, rich green; propodeum black; base of abdomen black, the apical 3.5 segments bright rufous; mandibles black, their apices rufous; scape black, flagellum brown, paler ventrally; tegulae brown; legs brown, the tibiae somewhat lighter and the tarsi light yellow-brown; outer side of front femora with strong greenish reflections. Fore wing with veins and stigma light brown, membrane uniformly tinged with light brown; hind wings subhyaline.

Mandibles with four teeth, the basal tooth large and somewhat rounded, separated from the next tooth by a large, narrowly V-shaped excision. Carinae margining the antennal scobes above strong, reaching nearly to eye margins. Front with a strong median impression which reaches nearly to the anterior ocellus. Front alutaceous, moderately shining, with abundant rather small punctures which on the lower part of the front are separated by about or somewhat less than their own diameters, toward the vertex by from 1.5 to 2.0 times their own diameters. Middle interocular line .55 times transfacial line, .94 to 1.02 times eye height; ocello-ocular line 1.25 times width of ocellar triangle; distance from tops of eyes to vertex crest equal to only about one third the eye height. Pro- and mesonota moderately shining, with small, rather sparse punctures. Propodeal disc with seven carinae, the pair closely paralleling the median carina weaker than the others, strongly transversely striate except laterally, where the striae are obsolescent; posterior face with the transverse striae strongly curved upward medially. Middle tibiae moderately spinose above.

Holotype: ♀, Port au Prince, Haiti (W. M. Mann) [MCZ]. *Paratype:* ♀, Sánchez, Dominican Rep., July 1938 (P. J. Darlington) [MCZ].

Anisepyris darlingtoni, n. sp.

Female: Length 5 mm.; length of fore wing 2.9–3.1 mm. Head black, the front and vertex dull green with strong golden and coppery reflections; thoracic dorsum green, with weak golden reflections; mesopleura black with bright green reflections; propodeum black; abdomen brownish-fuscous, the apical two segments weakly suffused with reddish-brown; mandibles and antennae dusky-ferruginous, the antennal flagellum light brown ventrally; tegulae brown; legs brown, slightly paler apically, side of front femora weakly reflecting green. Fore wing with veins and stigma dark brown, membrane uniformly suffused with light brown; hind wings subhyaline.

Mandibles with four teeth, the basal tooth broad, truncate, not separated from the next tooth by a deep excision as in the preceding species. Carinae margining antennal scrobes above relatively weak, reaching about two-thirds the distance to the eye margins. Front with a weak linear impression on the lower fourth. Front alutaceous, weakly shining, closely punctate, punctures on the lower part of the front separated by less than their own diameters. Middle interocular line .6 transfacial line, 1.1 times eye height; ocello-ocular line 1.35–1.40 times width of ocellar triangle; distance from tops of eyes to vertex crest equal to .4 the eye height. Pronotal disc moderately shining, punctures rather shallow; mesoscutum with a few weak punctures on the posterior half. Propodeal disc with seven carinae, strongly transversely ridged between the carinae, but the ridges obsolete on the sides; striae on the posterior face curved strongly upward medially. Middle tibiae strongly spinose above.

Holotype: ♀, Port au Prince & vicinity, Haiti, Oct. 6, 1934 (P. J. Darlington) [MCZ]. *Paratype:* ♀, Port au Prince, Haiti, Dec. 1926 (G. N. Wolcott) [USNM].

A male from the San Francisco Mts., Dominican Rep., Apr. 9, 1905 (A. Busch) [USNM] is assigned here tentatively. The head is olive-green, with golden reflections, and the front is closely punctate. The thoracic dorsum and mesopleura are green, the propodeum black and with seven discal carinae as in the female *darlingtoni.* The antennal flagellum is brown and unusually elongate, the legs light yellowish-brown.

Anisepyris planiceps (Fabricius)

Dryinus planiceps Fabricius, 1804, Systema Piezatorum, p. 201 ([♀], habitat in Americae insulis).

Epyris planiceps Westwood, 1874, Thesaurus Ent. Oxoniensis, p. 261.

Anisepyris planiceps Kieffer, 1907, Ann. Soc. Sci. Bruxelles 32: 11. —Kieffer, 1914, Das Tierreich 41: 440.

Fabricius' description of *planiceps* is brief and his type locality ambiguous. Westwood re-examined the type and presented a few additional notes on it. The species treated here agrees with the descriptions of Fabricius and Westwood in all but two particulars. Both state that the antennal scape is red, and Westwood states that the propodeum has only five carinae. In the specimens I assign here, the scape is piceous and there are seven propodeal carinae. The species cannot be Kieffer's *aureus,* which is said to have three propodeal carinae (but which I believe has five). If Fabricius' name is incorrectly applied to this species, then it will have to be described as new.

Specimens seen: CUBA: 1 ♀, Santiago de las Vegas, near Havana, Sept. 1923 (J. Acuña) [MCZ]; 1 ♀, Soledad, near Cienfuegos, Aug. 6–20 (N. Banks) [MCZ]; 2 ♀♀, Bahía Honda, Dec. 7, 1927 (S. C. Bruner) [MCZ, CU].

Anisepyris rufitarsis Kieffer

Anisepyris rufitarsis Kieffer, 1907, Ann. Soc. Sci. Bruxelles 32: 9, 13–14 (♂, Havana, Cuba).—Kieffer, 1914, Das Tierreich 41: 440.

I have seen no specimens assignable to this species. It may prove to be the male of *aurichalceus* or *planiceps*.

DESCRIPTION OF *BLASTOPHAGUS KHASIANUS*, NEW SPECIES (COLEOPTERA: SCOLYTIDAE)

By Jozo J. Murayama, Yamaguchi City, Japan

In the course of the study, at the Smithsonian Institution, of the species of Scolytidae imported into Japan, the writer found a specimen from Basilan, Philippine Islands, that agreed with one in the U. S. National Museum, from Assam, labeled *Blastophagus khasianus* Beeson.[1] As Beeson's name is a manuscript name, my use of it in the table published in Pan-Pacific Entomologist 33: 36, 1957, was as a nomen nudum. I am herewith describing the species for the convenience of future study, with Dr. Beeson's agreement, and the latter has kindly furnished me with the biological data given here.

Male. Cylindrical, slender, brownish yellow; antennae, tibiae, tarsi and apex of elytra yellow. Head with front quadrate, convex, slightly depressed transversely over the mouth and in middle, rugose with large shallow and sparse punctures, with an erect aureous seta arising from each puncture, among the setae a pair of particularly long ones; with longitudinal median keel from base to the center of front. Eyes large, elongate. Antennae with a long, large scape; funicles with 1st joint globular and large, 2nd to 6th short, increasing in width distally; clubs large, conic, wider than long. Vertex reticular with fine piligerous punctures. Prothorax wider than long, basal angles rounded, sides curved outwardly in basal half, thence strongly contracted anteriorly, apical border slightly emarginate in middle; surface convex, matt, sparsely set with large shallow piligerous punctures, punctures not denser along borders, hairs erect and short, dense, longer and recurved near sides, with a transverse depression behind the apical border, median impunctate line obscure. Scutellum small, oblong, convex, matt, with few piligerous punctures. Elytra cylindrical, slightly wider and two and one-half times as long as pronotum, with parallel sides to two thirds of elytral length, in the last third narrowed to rounded apical border which is elevated and crenulate, with teeth; basal border strongly rounded, with a deep depression around scutellum; punctures in the striae weak, shallow, round; interstices rugose, almost flat, with irregular rows of round punctures of same size as those in striae, basal third rugose with semicircular tubercles, rugosity strong at base, much weaker behind; on the declivity the second interstices narrow and depressed, not rugose nor tubercular; other interstices with a row of small tubercles, with short thick and erect hairs arising from punctures and tubercles respectively, with few minute ground hairs. Length 4.5 mm.

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[1] Beeson, C. F. C., The ecology and control of the forest insects of India and the neighboring countries, Dehra Dun, For. Res. Inst. & Oxford, Imp. For. Inst., p. 371, 1941.

Remarks: The specimen on which this description is based is in the U. S. National Museum, Eggers' Collection 1948, bearing the labels: "Shillong 6000′. Assam, C. F. C. Beeson leg, 9 VI, 1925, ex *Pinus khasia,* R. R. D. 414, B. C. R. 151, Cage 101, *Blastophagus khasianus* n. sp. C. F. C. Beeson det." USNM Type No. 64474.

This species, resembling *B. brevipilosus* Eggers, differs from it in its yellowish color, very weakly punctured pronotum, and elytra with shorter, weaker hairs and ground hairs. Such characters except for color could not be the result of immaturity of the insect. The following is a quotation from Dr. Beeson's report on the biological data:

". . . in *Pinus khasia* has similar habits to *B. piniperda,* the pine shoot beetle or Waldgaertner of Europe. In the bark of logs and branches the gallery-system consists of a single, longitudinal, axial mother-gallery with entrance-hole and radiating larval galleries. The young beetles after emergence attack the terminal shoots of the leader and top branches of pine of all ages; a tunnel is bored in the pith for 1 or 2 inches, hollowing out and killing the shoot which dries up and falls. Such tunnels are made for the purpose of feeding and not for laying eggs and are abandoned before the shoot withers. This form of attack causes a high mortality in *Pinus khasia* at higher elevations in the Khasia Hills."

SOME CALIFORNIAN OEDIPODINE GRASSHOPPERS, PARTICULARLY THREE SPECIES GIVEN THE SPECIFIC NAME *OCCIDENTALIS* BY LAWRENCE BRUNER (ORTHOPTERA, ACRIDIDAE)

By Ashley B. Gurney[1] and H. F. Strohecker[2]

Between 1889 and 1905 Lawrence Bruner described three oedipodine grasshoppers from California with the same specific name. These grasshoppers were *Scirtettica* (sic!) *occidentalis, Trachyrhachis occidentalis,* and *Oedipoda ? occidentalis.* Although each was in a different genus, the repetition of the specific name has contributed to the confusion involving the identity of the species. Following an examination of types, we have assembled the following notes, including two new lectotype selections, one new synonymy, and transfers of two of the species to other genera.

Microtes occidentalis (Bruner)

Scirtettica occidentalis Bruner, 1893, p. 267 *In* Riley, et al., Report on . . . . insects . . . . Death Valley Expedition (N. Amer. Fauna *7*: 235–268). Holotype, unique, listed by Rehn and Hebard (Proc. Acad. Nat. Sci. Phila. *64:* 126, 1912): Female labeled "Argus Mts. May 91 K", "A Koebele Collector", "Scirtetica occidentalis n. sp. Type. Det. by L. Bruner", "Type No. 1071, U. S. N. M." (USNM).

Microtes nubila Scudder, 1900, Can. Ent. *32:* 329–330. Lectotype, here selected: Male labeled "Monterey, Cal., VII-16 (Doane)", "Microtes nubila Scudder's Type 1900", and with a paratype label attached by Hebard (ANSP).

Dissosteira planipennis Bruner, 1905, Biologica Cent.-Amer., Orth. *2:* 162, 164. Holotype, unique, listed by Rehn and Hebard (l. c., p. 116, 1912): Female labeled "California. La Forge", and by Hebard as "Microtes occidentalis (Br.) '93" (ANSP). *New Synonymy.*

The types on which the three names were based have been examined and are in good condition, though that of *planipennis,* pinned with the right tegmen and wing spread, apparently was once preserved in fluid. Caudell, 1915 (Proc. U. S. Nat. Mus. *49:*

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[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C.

[2] Department of Zoology, University of Miami, Coral Gables 46, Florida.

28), said that *nubila* is a synonym of *occidentalis,* and Hebard showed by collection labels that he recognized the synonymy of *nubila* and *planipennis,* though he did not publish his conclusions.

The lectotype selection for *nubila* is made following considerable efforts to locate the original series, described by Scudder as "4♂, 1♀. Monterey, Cal., July 16. R. W. Doane (Mus. Leland Stanford Jr. University)". Inquiries to the late Dr. G. F. Ferris brought the response (in litt., March 11, 1956) that no such types are located at Stanford University, so it is presumed that Scudder intended only to indicate the source of material received for study. Manuscript notes made by Caudell in 1911 or earlier show that he saw "Scudder's types", but their location was not stated. During a recent visit to Cambridge, no specimens were found in the Museum of Comparative Zoology, and Dr. E. A. Chapin has written (June 24, 1957) that he failed to find specimens or a listing in the card catalogue of type material. Therefore, a selection has been made from an original pair at the Academy of Natural Sciences of Philadelphia, probably received in exchange. The unique original female was labeled as allotype by Hebard.

A large series of this species from Monterey County, Calif. (ANSP, USNM) has been seen, but no definite record from the Argus Mountains or nearby except the type of *occidentalis* has come to our attention. The habitat of the type of *planipennis* was given by Bruner in the original description as "Southern California, between San Diego and San Bernardino". However, the collector, Leon La Forge (through lapsus referred to by Bruner as "Mr. Leon, at La Forge"), also worked in the Monterey region, according to Rehn, 1945 (Ent. News *56:* 133), and it is uncertain where the type was collected. If *occidentalis* now occurs both in the mountains west of Death Valley and the Monterey area, the Tehachapi Range may have served as a connecting corridor. The collection month of the *occidentalis* type, May, is in contrast to August and September dates on Monterey County specimens examined, and perhaps this indicates an earlier seasonal appearance in the eastern part of the species' range. If so, differing climatic factors distant from and near the Pacific Coast may be responsible.

Conozoa occidentalis (Bruner), new combination

Trachyrhachis occidentalis Bruner, 1905 (Biologia Cent.-Amer., Orth. *2:* 174). Lectotype, designated by Rehn and Hebard (l. c., p. 116, 1912): Male labeled "S. Francisco, Cal.", "June", also a type label affixed by Hebard (ANSP).

Rehn and Hebard (l. c.) stated that *occidentalis* probably was described from a single specimen, and no other original specimens have been located. However, we have seen two males which may be taken as topotypes or essentially the equivalent; each bears an identical locality label, "San Francisco, Cal., 9-12-15". One, belonging to the National Museum, was identified by Hebard in 1917 or earlier as *Trachyrhachis occidentalis.* The other, belonging to the University of California, bears the determination label "*Conozoa wallula* (Scudder) . . . W. T. D." (the late Dr. W. T. Davis, as shown by similar hand-written initials on the determination labels of cicadas). These two specimens agree well with the lectotype of *occidentalis,* and Davis' identification is evidently an error. Examination of material collected in San Luis Obispo and Santa Barbara Counties, Calif., by P. D. Hurd and E. G. Linsley indicates that *occidentalis* is a distinct species, showing in its pronotal structure affinity to *Trachyrhachys,*[1]—but referable to *Conozoa* on the structure of the head and fastigium.

This placement of Bruner's *Trachyrhachis occidentalis* removes that genus from California lists, but the closely related genus *Metator* McNeill is represented in the state by *M. nevadensis* (Bruner). Another related genus, *Mestobregma* Scudder, is represented in California by *M. impexum* Rehn.

Conozoa wallula (Scudder)

Psinidia wallula Scudder, 1880 (Second Rept. U. S. Ent. Comm., Append. *2:* 27, pl. 17, figs. 13, 14) Lectotype, here selected: Male labeled "Sissons, Cal. Aug. 26", "Scudder's Type 1879", "Psinidia wallula Scudd.", "Type No. 4259" (USNM).

Scudder described *wallula* from an unspecified number of specimens reported from "Reno, Nev. Aug. 18; Sissons, Cal., August

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[1] Scudder's original spelling (Ann. Rept. Chief Engineer (U. S.) for 1876, Append. JJ, p. 291 (p. 511 of differently paged separate)) was *Trachyrhachys,* from two Greek words (rough, back), but Saussure 1884 (Prodrom. Oedipod., Mem. Soc. Phys. Hist. Nat. Geneve, *28,* no. 9: 162) modified it to *Trachyrhachis,* which spelling has been followed by most writers except Kirby, 1910 (Syn. Cat. Orth., *3:* 247), and Brooks, 1958 (Canad. Ent. 90, suppl. 9: 44). Scudder himself accepted the modification (Index N. Amer. Orth., pp. 327–328, 1901), and apparently the latter is the correct transliteration. Following the principle of giving preference to original spellings, however, we are using *Trachyrhachys.*

26; Wallula, Wash.; Dallas, Oreg., Sept. 3", and he figured a female from Wallula and a male from Sissons. No previous lectotype selection has come to our attention. The male chosen is in good condition and was never preserved in fluid. Two other male cotypes are in the National Museum, one without a locality label, the other labeled "Dalles, Oregon, Sep. 3". Since both Dallas and The Dalles are established Oregon towns, it is uncertain which locality is represented, but this is unimportant.

The hind tibiae of the lectotype are yellow. Although they are red in the majority of *wallula* specimens, they frequently are yellow, as mentioned by Fulton, 1930 (Ann. Ent. Soc. Amer. *23:* 613–614).

Trimerotropis occidentalis (Bruner), new combination

Oedipoda ? *occidentalis* Bruner, 1889 (Proc. U. S. Nat. Mus. *12:* 77–78, pl. 1, fig. 7). Lectotype, selected by Rehn and Hebard (l. c., p. 66, 1912): Male labeled "S. Frisco. Cal. Nov. 87", also a type label affixed by Hebard (ANSP).

T. occidentalis was originally described from an unstated number of specimens reportedly taken "On high stony hill-tops to the southwest of San Francisco, Cal., late in October (Koebele, Bruner)". Two lectoparatypes, male and female, here so designated, and with identical locality labels agreeing with that of the lectotype, are in the National Museum. These locality labels are handwritten, and in the absence of a collector's name it is uncertain who collected the specimens. Koebele collecting labels which we have seen on other species are printed ones, though there may be exceptions; also, no record of a Bruner trip to California in 1887 is available. The name Bruner in parentheses does not necessarily indicate that he was a collector of the material concerned, as shown by its use on page 82 of the 1889 paper. There, the name referred to his collection, since the specimens were said to have been received from another person. The inference is that Bruner published locality data (including October) for *occidentalis* which were available to him from sources other than the labels, or that certain specimens not now available bore the published data.

This species was placed in *Scirtetica* by Kirby (Syn. Cat. Orth. *3:* 236, 1910), who probably was confused by Bruner's different usages of the specific name *occidentalis,* because he erroneously placed *S. occidentalis* Bruner, 1893, as a synonym. Caudell, 1911 (Ent. News *22:* 163), pointed out Kirby's error and said that *Oedipoda occidentalis* belongs in *Circotettix*. Although *Circotettix* and *Trimerotropis* are closely related and some species show a near-overlap of characters,[2] a comparison of *occidentalis* with the respective genotypes, *C. undulatus* (Thos.) and *T. maritima* (Harris), and with its close relatives, shows that it is assignable to *Trimerotropis.* The best external characters for separating *Circotettix* and *Trimerotropis* occur in the anal field of the wing. In addition to the convex anal veins typically being swollen in *Circotettix,* not so in *Trimerotropis,* there usually are small narrow cells bordering the anal veins in the apical third of the wings of *Circotettix;* these cells usually are lacking in *Trimerotropis* or are broader. The swollen veins, but not the cells, were illustrated and used in a key to genera by Gurney, 1940 (Proc. Ent. Soc. Wash. *42:* 2, 15), though he there referred to the veins as radiate veins, following a practice then general among American authors; present terminology is from Ragge, 1955 (Wing-venation of the Orthoptera Saltatoria, p. 159) who used the Comstock-Needham system.

T. occidentalis closely resembles some specimens of *fontana* (Thos.) which have indistinct tegminal bands. The latter species is variable, especially with respect to the transverse bands of the tegmina, as has been discussed by Fulton, 1930 (l. c., p. 614), who has even suggested that *T. koebelei* (Bruner)[3] may be but a color variant of *fontana.* *T. occidentalis* tends to have shorter antennae and proportionately broader hind femora than *fontana.* A series of 3 males and 5 females of *occidentalis* from San Francisco and Santa Clara Counties, Calif., and a similar number of each sex of *fontana* from Californian localities was measured with results as follows: Ratio of length of antenna/length of pronotum—*occidentalis* (males 1.92–2.03, av. 1.98; females 1.63–1.78, av. 1.69); *fontana* (males 2.24–2.57, av. 2.52; females 1.70–1.86, av. 1.82). Ratio of length of hind femur/width of hind femur—*occidentalis* (males 3.38–3.52, av. 3.44; females 3.08–3.57, av. 3.41); *fontana* (males 3.66–4.44, av. 4.02; females 3.59–3.97, av. 3.74). The antenna of *occidentalis* is more slender than that of *fontana,* and the ventral margin of the hind femur is less gradually curved in the region of the maximum width than in *fontana.* The exact relationship of these species remains to be clarified by a much needed modern revision of *Trimerotropis.*

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[2] Helwig, 1955 (Univ. Colo. Studies, Biol. *3:* 47, 64), and White (Advances in Genetics *4:* 303–314, 1951; and other papers) have made clarifying cytological studies of the two genera, concluding, for instance, that the species long known as *C. verruculatus* (Kirby) belongs to *Trimerotropis.*

[3] The unique male type of *koebelei,* to which Fulton referred, is in the U. S. National Museum, where it was catalogued in April 1899, when various grasshopper types which had been there considerably earlier were formally recorded. Its location warrants this mention because McNeill, 1901 (Proc. U. S. Nat. Mus. *23:* 421), in his revision of *Trimerotropis,* attributed the type to the Bruner Collection. His statement may have been the basis for the Rehn and Hebard reference to the type (l. c., p. 64, 1912), "Bruner Collection. Sent to McNeill", thus inferring that the type was lost, as it is well known that some material in McNeill's possession was destroyed. At the time the type was collected, Koebele was employed by the U. S. Department of Agriculture, and he sent much material to C. V. Riley; this probably explains why the type was kept by the National Museum instead of by Bruner, though McNeill erred in his statement.

THE OTTO BUCHHOLZ COLLECTION OF LEPIDOPTERA

By Rowland R. McElvare, Southern Pines, N. C.

Following the death of Otto Buchholz of Roselle Park, N. J., in September, 1958, his important collection of Lepidoptera has been acquired by the American Museum of Natural History, New York City. One of the outstanding private collections in its field, the Buchholz Collection consists of species from North America, north of Mexico, arranged according to the McDunnough Check List. Few collections anywhere can match the fine condition of the material and the excellence of the mounting at which Mr. Buchholz was an expert.

In round numbers there are 125,000 specimens. True butterflies (Papilionoidea) comprise 18,000 specimens, skippers (Hesperioidea) about 6,500, and moths, 100,000. Of the butterflies, there are about 5,000 specimens each of Nymphalidae and Lycaenidae. Of the 100,000 moths, Noctuidae make up slightly more than half the specimens, Geometridae a quarter, with some 5,000 Arctidae and 2,600 Notodontidae. The other moths are distributed through various families, exclusive of the micros which have only a nominal representation.

Included is the following type material: butterflies—83 paratypes, with two holotypes and one allotype in the Lycaenidae; skippers—80 paratypes; moths—388 paratypes, of which 207 are in the Noctuidae and 150 in the Geometridae. There are three holotypes and two allotypes, all in the Noctuidae.

Mr. Buchholz was a long time member of the Society and attended its meetings with great regularity, usually accompanied by his friend, F. T. Naumann, a former president of the Society, now retired to Forsyth, Ga., where he is interested in breeding butterflies. Their arrival from New Jersey on meeting nights was a signal that it was eight o'clock and time for the meeting to start.

An enthusiastic collector, Mr. Buchholz was not awed by the stony eye of suspicious guardians of the law if he saw a desirable specimen, flying late at night around a village light or even on the window of a bank or jewelry store. Sometimes, however, discretion prevailed. On his last big field trip, which he made alone to west Texas at the age of 74, he pulled his car off the road at one place to investigate a stony patch of ground. A passing native stopped and watched for a time with a fascination beyond that usually accorded entomologists by an incredulous public. Presently he called out to Mr. Buchholz to ask if he was one of those "snake fellers", pointing out that more rattlesnakes had been found among the rocks where he was standing than in any other part of that county. Mr. Buchholz withdrew to his car.

His daughter, Mrs. H. C. Evans, informs us that he was born in Hanover, Germany, in September, 1874, and started collecting butterflies at the age of ten. At sixteen, he emigrated to the United States and was associated with the Aluminum Company of America as a mechanical engineer for twenty-five years, retiring in 1944 to devote all his time to his collection.

He was a member of an older generation that worked with insects because they liked them—a breed that is rapidly disappearing. Their activities, however, have made possible many important entomological studies with which a later generation is concerned, and the Buchholz Collection is a notable contribution to that end.

A NEW PTEROMALID PARASITE OF THE EASTERN DEATH WATCH BEETLE, *HADROBREGMUS CARINATUS* (SAY)

By George E. Wallace[1]

During the summer of 1956, Mr. David Miller of Terminex Co., Pittsburgh, presented me with some Pteromalidae (Hymenoptera; Chalcidoidea) that he had collected at Titusville, Pa. in a stable which was infested with the Eastern Death Watch Beetle. The specimens proved to belong to the genus *Cerocephala,* and to constitute a new species, the description of which is given below.

With the kind permission of the property owner, Miss Violet Dubar, the site was visited by Mr. Miller and myself in the summer of 1957. One additional specimen of the new species was secured on this visit, and later, still another specimen emerged from a quantity of infested wood that we collected then.

I am indebted to Dr. B. D. Burks and Dr. T. J. Spilman of the Insect Identification and Parasite Introduction Laboratories, U. S. Department of Agriculture; to the former for his helpful comments and obliging courtesy in making comparative examinations; to the latter for identification of the host beetle. Mr. Clifford J. Morrow, Carnegie Museum, kindly executed the illustrations here. Finally I am, of course, much obligated to Miss Dubar, for whom the species has been named, and to Mr. Miller.

Cerocephala dubarae, n. sp.

Female: Length 2.21–2.90 mm. Cheeks and temples very weakly striate. Face with feeble striations converging toward the clypeus. Anterior margin of clypeus with a weak tubercle at each side. Anterior half of pronotum with transverse striations, posterior portion of pronotum, as well as mesonotum, parapsides, axillae, scutellum, and abdomen glassy smooth. Parapsidal furrows, and the suture anteriorly bounding scutellum each constituted as a line of very minute punctures. Propodeum finely and densely punctate, a median carina weakly indicated in some specimens. Dorsal aspect of abdominal petiole longitudinally striate.

Head slightly wider than long. Occipital carina present. Antennal scrobes separated by a prominent carina; two smaller sinuate carinae also present on the face, one located laterad of each antennal insertion, the two slightly converging below toward the clypeus. Except where median carina is produced into an abrupt

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[1] Section of Insects and Spiders, Carnegie Museum, Pittsburgh, Penn.

lobe between the antennal insertions, all carinae are smooth in outline—none with spur-like projections (fig. 1). Antennae clavate, gradually increasing in width from first funicle joint to club. First funicular segment about one and one-half times as long as broad, second slightly longer than broad, third quadrate, fourth to sixth slightly broader than long; club conic-ovate, a little longer than the last two funicular segments.

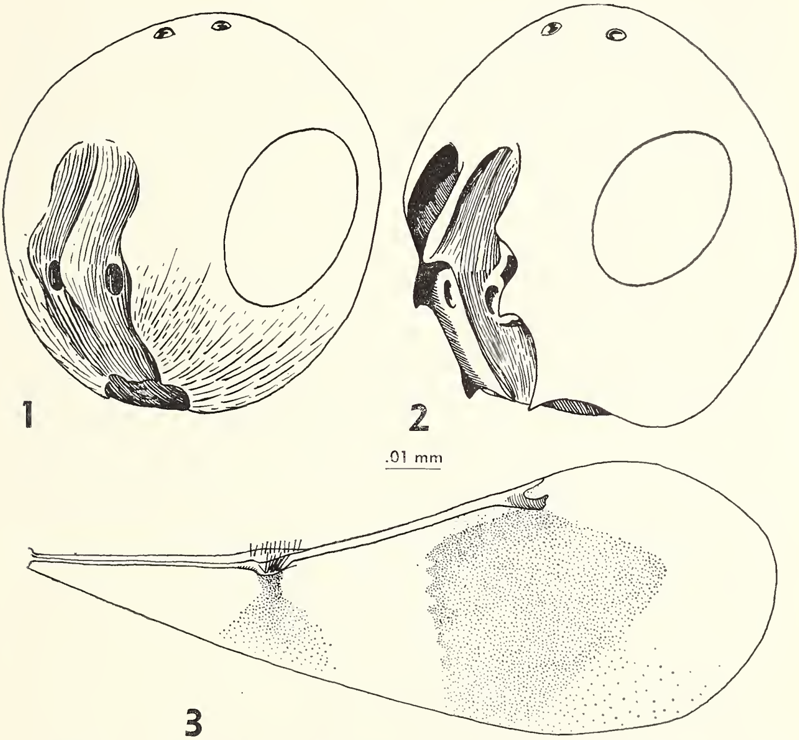

Fig. 1. *Cerocephala dubarae* Wallace, head, semiprofile. Fig. 2. *C. cornigera* Westwood, head, semiprofile (after Gahan). Fig. 3. *C. dubarae,* right forewing.

Forewings having submarginal, marginal, postmarginal, and stigmal veins in ratio of 65 : 56 : 6 : 7. Two dilute brown bands extending across wing (fig. 1); the proximal band arising from the junctural callus of marginal and submarginal veins, and widening posteriorly; apical band somewhat arrowhead-shaped, lying mostly behind the stigmal, and apical third of marginal veins, and extending as a point to about midway to wing apex.

Abdomen, including ovipositor, 1/6 longer than thorax. Ovipositor approximately 1/3 as long as gaster. Abdominal petiole 1/3 the length of hind coxa. First tergite medially encised, comprising 3/8 of gaster; tergite 3 equal to nearly half of tergite 1; tergites 2 and 4–6 shorter, subequal.

Color-shading, individually variable from fulvous to black. In lighter individuals: scapes, head with exception of ocellar and gular areas, prothorax, parapsides, axillae laterally, apical half of first abdominal segment, basal half of ovipositor sheaths, and legs, excepting major portions of fermora and tibiae, fulvous; flagellum and club brown, the latter darker. Abdominal segments 2–6, basal half of first segment, and most of propodeum black or nearly so; antero-lateral angles of the propodeum brown; remainder of thorax brown, but deepening to nearly black along following areas: dorsal sutures, pro- meso- and meta-sternites, ocellar and gular areas, and most of upper portions of femora and tibiae. In darker-colored individuals: fulvous areas mentioned are brown with antero-lateral margins of prothorax nearly black; propodeum all black.

Male: Length 1.89; 2.00 mm. Similar to female except for the following differences of antennal, abdominal, and petiolar characters: Funicular segments 2–5 subequal in length and constricted at junctures, somewhat suggesting a pedicellate condition. Abdominal petiole punctate on upper surface, nearly as long as hind coxae (24:29). Remainder of abdomen twice the length of petiole; first two segments extending over entire abdomen; first tergite 1/3 longer than second, the hind margin entire.

Type Locality: Titusville, Pa. (Crawford County).

Types: Holotype, allotype, and one female paratype, Carnegie Museum. Two female paratypes and one male paratype, U. S. National Museum. One female paratype, Canada Department of Agriculture.

Remarks: This species is very similar to *C. cornigera* Westwood, a European species which I have not seen, but on which Gahan has published re-desciptive notes (Gahan, A. B., Proc. U. S. Nat. Mus. 96 (3203): 358–360. 1946). From *cornigera, dubarae* differs chiefly in the shorter ovipositor, in the lack of any sharp prominences on the facial carinae (fig. 1), and in less prominent tubercles on the clypeal margin. According to Dr. Burks, who compared a specimen of *dubarae* with the National Museum's series of *cornigera,* the latter species has the wings shaded less extensively, although with a similar pattern. From *C. aquila* Girault, *dubarae* may be distinguished by the smooth posterior half of the pronotum—*aquila* having the pronotum completely striated. The shorter abdominal petiole separates *dubarae* from *C. dinoderi* Gahan in which species the petiole exceeds the hind coxae in length.

NEW SPECIES OF *BANASA* FROM THE CARIBBEAN AREA AND COMMENTS ON THE STATUS OF *SCHRADERI* SAILER (HEMIPTERA: PENTATOMIDAE)

By Reece I. Sailer[1]

This paper, like my earlier one on *Banasa* (Sailer, 1957), provides technical names for use by Franz and Salley Hughes-Schrader of Columbia University, in reporting the results of their cytological investigations on this genus. After my 1957 paper was published, they submitted new material containing four more undescribed species as well as additional specimens of *panamensis* Sailer and *schraderi* Sailer. Upon studying the additional specimens of *schraderi,* I found that the population to which this name is applied must be reduced to the rank of a subspecies. Reasons for the change are discussed below.

The names for the four new species described in this paper were made available to the Schraders and used in their paper (Schrader and Schrader, 1958). There may be some question regarding validation of the names in that publication. A decision on this point depends upon how Article 25c of the Code of Zoological Nomenclature is interpreted. Article 25c reads:

> "But no generic or specific name, published after December 31, 1930 shall have any status of availability (hence also validity) under the Rules, unless and until it is published either (1) with a summary of characters which differentiate or distinguish the genus or the species from other genera or species." (2) or with definite bibliographic reference . . . [etc.]."

The information contained in the Schraders' paper could be used to distinguish between the species treated in their paper. However, such identifications could be made only by experienced cytologists applying the complicated and highly refined techniques used by the Schraders. Their paper was not concerned with systematics but with the comparative cytology and biochemistry of the reproductive cells of the different species and with interpreting differences in light of their evolutionary implications. It is scarcely conceivable that their technique could be used routinely in systematic studies and therefore it is my opinion that the information published by the Schraders fails to fulfill the requirements of Article 25c and does not validate the names for the purpose of systematic zoology.

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[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture.

If a rigid interpretation requires that the names be credited to the Schraders, it will still be important that the species be described in conventional terms and related to the existing scheme of classification. In this event the present paper will serve to fix the type specimens and clearly establish the identity of the species that were studied cytologically by the Schraders.

Banasa bidens subsp. *schraderi* Sailer, *NEW STATUS*

Banasa schraderi Sailer, 1957, Bul. Brooklyn Ent. Soc. 52: 85–86.

When *schraderi* was described, two characters seemed to distinguish the type series from specimens identified as *bidens* Van Duzee. First, *schraderi* had fewer and smaller punctures on the dorsal surface, the head and particularly the juga being nearly smooth; second, there appeared to be significant differences in the male genitalia. Four of the five specimens available for study were collected at Turrialba, Costa Rica, by Dr. Schrader; the fifth had been taken many years earlier from the same locality. Not long after the description of *schraderi* appeared, Dr. Schrader sent additional specimens for identification. These came from Barro Colorado Island, Canal Zone, Panama, and closely resembled *schraderi.* However, their parameres were similar to those of *bidens.* Since the genital structures published with the description of *schraderi* were drawn from a single paratype, I dissected as many additional specimens as possible, including the holotype of *schraderi,* to learn whether the characters of the male genitalia were stable and to what extent the differences could be related to differences in dorsal punctation.

To my great surprise the genitalic structures of the holotype of *schraderi* proved to be different from those of the paratype and were similar to those of the males from Barro Colorado Island. For comparison these structures are illustrated in figures 1 and 5. Specimens similar to the holotype in punctation and genital structure now include examples from Turrialba, Costa Rica; Barro Colorado Island, and Paraiso in the Canal Zone of Panama; and Meta Villavicencio, Colombia. Since they can all be distinguished from the typical *bidens,* so far known only from Trinidad, *schraderi* may be retained as a subspecies. There remains the possibility that *bidens* will prove to a synonym of either *varians* Stål, 1872, or of the still older name *subrufescens* Walker, 1867.

The paratype specimen illustrated in the description of *schraderi* was the one listed under the F. Schrader number, CR 49F25.

It and another paratype listed as from the Schild-Burgdorf collection belong to an unnamed species closely related to the species described below as *zeteki*.

Banasa zeteki, n. sp.

Except for the more densely punctured dorsal surface, this species resembles *schraderi* Sailer very closely. The more numerous dark punctures cause it to appear darker in color. No females are available for study, but the male characters indicate that *zeteki* probably belongs to the *subrufescens* species group.

Color and surface sculpture.—Head and pronotum back to a line between the humeral angles stramineous, tinted with pale green and pink. Remainder of pronotum and most of scutellum olivaceous. Tip of scutellum smooth, nearly white. Head with tylus, a spot adjacent to each eye and two parallel bands on frons smooth, remainder of head with scattered punctures. Fuscous punctures form an impressed row along anterior margin of pronotum, are scattered irregularly on anterior lobe and are almost absent on line between humeral angles. Remainder of pronotum, scutellum except the tip, and each corium more numerously and regularly punctate. Veins of membrane darkened and in one specimen the color fuses to form two dark spots in basal area. Propleuron with scattered dark punctures, mesopleuron smooth with dark spot on anterior margin; metapleuron with 3 or 4 dark punctures laterally beyond the evaporative area and more numerous small punctures on posterior lateral area. Venter smooth, stramineous, acute posterolateral angles of each segment and adjacent areas in anterolateral angles black. Tergum dark, almost black, connexiva stramineous to green.

Antenna with 3 basal segments green or yellowish, 4th green at base, apical three-fourths infuscated, 5th pale with broad fuscous band around middle. Apex of rostrum and apical half of each claw black, legs otherwise pale.

Structure.—Ovate, pronotum and basal two-thirds of scutellum convex in lateral view. Head with juga sinuate before the eyes and regularly rounded to apex of tylus. Rostrum barely extending beyond the hind coxae, ratio of segments as 4 : 5 : 5 : 4. Ratio of antennal segments as 2 : 3 : 5 : 6 : 6. Venter of abdomen with basal spine tuberculate, barely reaching apices of hind coxae. Male paramere as shown by figure 2.

Length, including membrane: Male, 9.5 mm.[1]

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[1] Measurements are taken from holotype and allotype specimens.

None of the species described in this paper show significant size variation among the few specimens contained in the type series.

Width across humeral angles: Male, 5.1 mm.

Type material.—Holotype: ♂, Barro Colorado Island, C. Z., Panama, May 23, 1957, F. Schrader, No. A69; U. S. National Museum cat. no. 64405. Paratypes: ♂, same data, collected May 24, 1957, No. A79. 1 ♂, same locality, March, 1944, J. Zetek. 1 ♂, Paraiso, C. Z., Panama, Jan. 27, 1911.

This species is named in honor of James Zetek who directed the Barro Colorado Laboratory for many years and added immeasureably to our knowledge of the natural history of the Island.

Banasa centralis, n. sp.

Superficially similar to *subrufescens* (Walker), 1867. However, the structure of the female's genitalia is quite different from that of the species belonging to the *subrufescens* group (compare figs. 8 and 10). Among the described species the external male genitalia of *centralis* are most like those of *calva* (Say), 1831. In both, the posterolateral angle of the pygofer is folded inwardly to produce a pronounced marginal notch before each lateral angle.

Color and surface sculpture.—Head and pronotum back to a line between the humeral angles stramineous with raised callus appearance most pronounced between the humeri. Punctures on head prominent, fuscous rather evenly distributed, a smooth area at inner angle of each eye, reduced in size and number on tylus and toward apices of juga. Pronotum with an impressed line of fuscous punctures immediately behind the anterior margin, similar punctures tending to outline the calli and scattered transversely across the anterior lobe. Smaller fuscous punctures more numerous and scattered more uniformly over remainder of dorsal surface except pale apex of scutellum. Posterior lobe of pronotum, the scutellum and corium, stramineous to olivaceous and invaded over much of the corium by rufous. Membrane hyaline tinted with brown and underside of body pale stramineous except for black spot on each meso- and metapleuron. Scattered shallow punctures on pleurites. Evaporating area opaque. Venter of abdomen entirely smooth.

Antenna with 2 basal segments pale-green, 3rd rufescent on apical half, 4th rufescent, but pale basally; 5th rufescent except for pale basal half and extreme apex. Apex of rostrum and apical half of each claw and small dentation at posterolateral angle of each abdominal segment fuscous.

Structure.—Elongate oval. Pronotum and basal half of scutellum convex. Head with juga sinuate before the eyes and evenly rounded to apex of tylus. Rostrum barely exceeding the hind coxae, ratio of segments as 12 : 22 : 19 : 16. Ratio of antennal segments as 8 : 13 : 20 : 26 : 27. Venter of abdomen with basal spine reduced to blunt tubercule and barely reaching apices of hind coxae. Male paramere as shown by fig. 6. Female genitalia as shown on fig. 8.

Length, including membrane: Male, 10.4 mm.; female, 12.0 mm.

Width across humeral angles: Male, 5.5 mm.; female, 6.1 mm.

Type material.—Holotype: ♀, Siquirres, Costa Rica, May 20, 1944, F. Schrader, No. 297; U. S. National Museum cat. no. 64404. Allotype: 1 ♂, Cayuga, Guatemala, June, 1915, Wm. Schaus. Paratypes: 1 ♂, same data; 1 ♂, same locality, Aug., Schaus and Barnes; 1 ♂, same locality, Nov., 1915, Wm. Schaus.

Note.—Ordinarily in *Banasa* males should be selected as holotypes. However, in this instance the Schrader's female specimen is so designated as a measure of insurance that their cytological data will remain asociated with the name *centralis*. Although it seems unlikely, in view of the excellent diagnostic characters exhibited by the females of most species of *Banasa,* there is a possibility that the holotype is not conspecific with the female from Guatemala.

Banasa minor, n. sp.

This species is smaller than *bidens schraderi* Sailer, 1957, which it in some degree resembles, though it is less punctate, more shining and lighter colored. The female genital plates are not lunately excavated at their inner apical angle and therefore the species cannot be associated with the subrufescens group to which *b. schraderi* belongs. Its relationship to other species of *Banasa* must await a thorough study of the genus.

Color and surface sculpture.—Head, pronotum, scutellum, and embolium pale green, remainder of corium stramineous invaded with rufous. Apex of scutellum broadly pale or stramineous. Entire dorsal surface shining. Head almost smooth, with few punctures and these not colored or but faintly tinted with rufous. Calli and margins of pronotum smooth, an impressed line of pale punctures behind anterior margin, remainder of pronotum with scattered rufescent punctures. Convex portion of scutellum similar to pronotum, punctures more crowded on apical third before the smooth pale apex. Punctures on embolium more numerous and darker than those on pronotum. Body beneath, stramineous tinted with green, shining and smooth except for scattered shallow punctures on pleurites.

Antenna green becoming fulvous on apical two-thirds of 4th and

5th segments. Legs with pale green tint similar to general body color. Apex of rostrum and apical half of claws black.

Structure.—Ovate, pronotum and basal two-thirds of scutellum convex. Margins of head sinuate before the eyes, then gradually rounded to the apex of tylus. Length of head to width across eyes as 7 : 9. Rostrum not exceeding apices of hind coxae, ratio of segments as 9 : 15 : 13 : 10. Ratio of antennal segments as 5 : 7 : 13 : 15 : 18. Venter of abdomen with ventral spine obtuse, barely reaching apices of hind coxae. Male paramere as shown by fig. 3. Female genitalia as shown by fig. 7.

Length, including membrane: Male, 7.6 mm.; female, 8.5 mm.

Width across humeral angles: Male, 4.5 mm.; female, 4.7 mm.

Type material.—Holotype: ♂, Barro Colorado Island, C. Z., Panama, May 25, 1957, F. Schrader, No. A87d; U. S. National Museum cat. no. 64407. Allotype: ♀, same data, No. A78b. Paratypes: 2 ♂ 1 ♀, same data, No. 87b, No. A87c; 1 ♂, same data, collected May 24, 1957, No. A78a; 1 ♂, 1 ♀, collected May 23, 1957, No. A68, No. A68b; 1 ♂, collected June 1, 1957, No. A127; 1 ♀, Cayuga, Guat., April, 1915, Wm. Schaus.

Banasa rufifrons, n. sp.

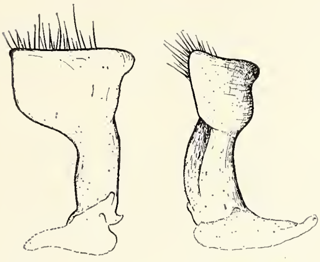
Related to *lenticularis* Uhler, 1894, being similar in size, shape and predominantly green color. The characters of the male and female genitalia also indicate close relationship. The dorsum of *rufifrons* is more punctate than that of *lenticularis* and the punctures on the head are not only more numerous but are fuscous instead of faintly if at all colored.

Color and surface sculpture.—Head stramineous, suffused with red. Anterior lobe of pronotum variegated with stramineous, calli and ivory areas interrupted with pale green and rufescent. Remainder of dorsum pale green almost hyaline. Fuscous punctures on head numerous except on occiput and areas at inner angle of each eye, forming an impressed line behind anterior margin of pronotum, absent on the calli, numerous on disk and more scattered over rest of anterior pronotal lobe. Small rufescent punctures

EXPLANATION OF PLATE

Figs. 1–6, lateral and mesal aspect of left paramere. Fig. 1, *Banasa bidens bidens*. Fig. 2, *B. zeteki*. Fig. 3, *B. minor*. Fig. 4, *B. rufifrons*. Fig. 5, *B. b. schraderi*. Fig. 6, *B. centralis*. Figs. 7–10, external female genital structures. Fig. 7, *B. minor*. Fig. 8, *B. centralis*. Fig. 9, *B. rufifrons*. Fig. 10, *B. b. bidens*.

SAILER



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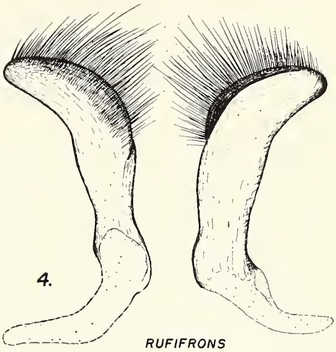

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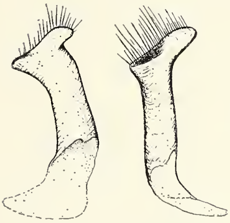
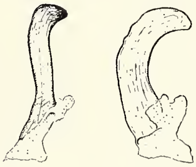


2. ZETEKI



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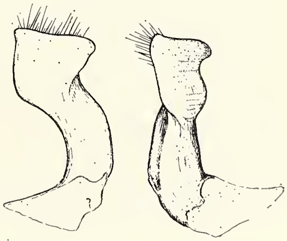
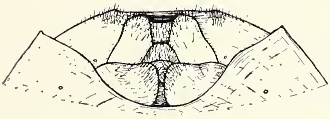


5. BIDENS SCHRADERI



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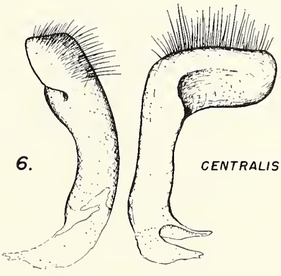

6. CENTRALIS

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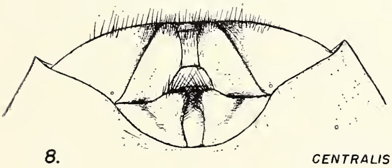

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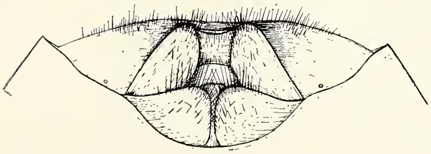

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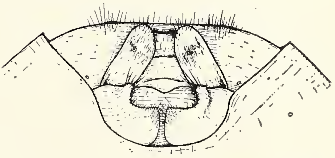

10. BIDENS BIDENS

scattered over rest of dorsum. Membrane hyaline almost colorless. Venter luteous, a few scattered punctures on protergite and posterior margin of metatergite. Body generally shining.

Antenna with first three segments pale green, the apical halves of last two darkened. Apex of rostrum and apical half of claws fuscous.

Structure.—Elongate, oval. Dorsal surface rather uniformly convex, apical third of scutellum only moderately depressed. Head with juga sinuate before the eyes and gradually rounded to apex of tylus, length to width across eyes as 12:9.5. Rostrum barely attaining hind margins of coxae with ratio of segments as 11 : 20 : 17 : 13. Ratio of antennal segments as 7 : 11 : 18 : 21 : 20. Venter of abdomen with basal spine subacute, barely reaching apices of hind coxae. Male paramere as shown by fig. 4. Female genitalia as shown by fig. 9.

Length, including membrane: Male, 9.8 mm.; female, 11.1 mm.

Width across humeral angles: Male, 5.3 mm.; female, 5.9 mm.

Type material.—Holotype: ♂, Barro Colorado Island, C. Z., Panama, May 30, 1957, F. Schrader, No. A119; U. S. National Museum cat. no. 64406. Allotype: ♀, same data. Paratypes: 1 ♂, 1 ♀, May 24, 1957, No. A80 and A103, otherwise same data. 1 ♂, same locality, May 13, 1937, S. W. Frost.

LITERATURE CITED

Sailer, R. I. 1957. Two new species of *Banasa* from Central America (Hemiptera: Pentatomidae). Bul. Brooklyn Ent. Soc. 52 (4): 85–88.

Schrader, F. and **Hughes-Schrader, S.** 1958. Chromatid autonomy in *Banasa* (Hemiptera: Pentatomidae). Chromosoma 9 (3): 193–215.

Five Monellia Aphids in Utah: From my 1957 collecting, Hille Ris Lambers identified the following species of *Monellia* aphids from Utah: *M. californica* Essig, alates on walnut at Provo, September 27; *M. caryae* on *Juglans nigra*, September 27 at Geneva and Payson; *M. caryella* (Fitch) May 7, and *M. costalis* (Fitch) June 13 and September 24, on pecan foliage at St. George; and *M. nigropunctata* Granvosky on *Juglans nigra* at Geneva and Payson on September 27.—GEORGE F. KNOWLTON, Logan, Utah.

TWO ADDITIONAL ADVENTIVE EUROPEAN WASPS IN THE UNITED STATES (HYMENOPTERA: SPHECIDAE, CHRYSIDIDAE)

By Karl V. Krombein[1]

The purpose of this note is to record the present distribution in the United States of two adventive wasps from Europe, and to give a few notes on their diagnostic characters. These wasps are the sphecid *Pemphredon* (*Cemonus*) *lethifer lethifer* (Shuckard), 1837, and the chrysidid *Omalus auratus* (Linnaeus), 1758.

For many years I have supposed that *P. lethifer* was the species Fox (Trans. Amer. Ent. Soc. 19: 312, 1892) identified as *inornatus* Say, 1824. However, a recent check of material in the Academy of Natural Sciences of Philadelphia showed that all specimens identified by Fox as *inornatus* are actually *tenax* Fox except for one male of *lethifer.* Say's description of *inornatus* from Pennsylvania is very brief, and could apply to any of the eastern species of the subgenus *Cemonus.* It seems preferable to treat *inornatus* as an unrecognized species, rather than to apply Say's name to the wasp that has been known as *lethifer* in Europe for so many years.

I am indebted to my colleague J. de Beaumont, Musée Zoologique at Lausanne, Switzerland, for examining a pair of *lethifer* from the United States. He stated that this pair was closer to specimens of typical *lethifer* from southern Europe than to those from central Europe, particularly in the punctation of abdominal terga. However, other material from U. S. shows variation in this respect. I suspect that there have been multiple introductions of this wasp during the past three centuries from various parts of Europe. It nests in the soft pith of various domesticated plants such as roses and berries, and could readily have been brought in with stocks of these plants for propagation.

I have seen specimens of *lethifer* from the following states and provinces: Ontario, Massachusetts, Rhode Island, New York, Pennsylvania, Maryland, District of Columbia, Virginia, Florida, West Virginia, Ohio, Michigan, Indiana, Illinois, and Colorado.

I have seen no specimens of the European *P. lethifer fabricii* Müller from U. S. Dr. de Beaumont states that it nests in stems of *Phragmites* and in galls of *Lipara,* so there is much less likelihood of its introduction. The species may be distinguished from other members of subgenus *Cemonus* occurring in U. S. by the following

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[1] Entomology Research Division, Agricultural Research Service, U. S. D. A., Washington, D. C.

combination of characters: Base of propodeal enclosure with short radiating rugulae, the rest of enclosure smooth; median lobe of clypeus of female truncate at apex, of male shallowly and broadly emarginate; third to sixth sterna of male with short appressed hair; fourth to seventh flagellar segments of male rounded out beneath.

The cuckoo wasp *Omalus auratus* is a parasite of *Pemphredon lethifer* and undoubtedly was introduced with nests of the latter. In the United States it has been reared from nests of *lethifer* in Maryland and Ohio. There are no records of its parasitizing other twig-nesting pemphredonines in U. S.

I have seen specimens of *auratus* from New York, Maryland and Ohio. It is separated from any of the currently recognized American *Omalus* by the combination of coppery abdomen, and long, scattered erect hair on pronotum and scutum.

PUBLICATIONS RECEIVED

An Introduction to the Behaviour of Invertebrates, by J. D. Carthy, 385 pp., 148 figs. 1958. The Macmillan Company. "Work on the behaviour of invertebrates in recent years has aimed at explanations of their ecology and life activities based on the results of analytical laboratory studies. Inevitably, interest centres on the functions of the sense organs, and this book is therefore concerned largely with the stimuli impinging on the animal and with their reception, as well as with the consequent reactions. . . . The book, which incorporates a good deal of original work, is the first to give a general conspectus of the great advances made in recent years in our knowledge of the behaviour of invertebrates."—quoted from the front flap. (Price, $8.00).

Free-living Nematodes and other small Invertebrates of Puget Sound Beaches, by W. Wieser. University of Washington Publications in Biology, vol. 19, 189 pp., 109 drawings. 1959. "The first intensive study of nematodes in any region of the United States, this book is the result of an investigation into the distribution and ecology of nematodes, as well as gastrotrichs, archiannelids, and associated animals of other groups inhabiting the beaches of Puget Sound." (Price, $4.00).

PUBLICATIONS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

The Bulletin, Old Series, Vols. 1–7, 1879–1885, Complete on positive microfilm	$10.00
The Bulletin, New Series, Vols. 8–52, 1912–1957, Complete, unbound	$90.00
Entomologica Americana, Vols. 1–6 (1885–1890) and 7–10 (1926–30), positive microfilm	$12.00
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A Glossary of Entomology, Torre-Bueno, cloth bound. Domestic postpaid, foreign 25 cents extra	$ 5.00

Monographs from Entomologica Americana

Studies on the Pleuropodia of Belostoma flumineum and Ranatra fusca, Hussey. 81 pp., 74 figs. 1926	$ 1.00
The Family Hydrometridae in the Western Hemisphere, Torre-Bueno. 46 pp. 1926	$ 1.00
A Contribution to the Knowledge of the Life History of Bremus bimaculatus, Frison. 65 pp., 8 figs. 1928	$ 1.00
A Revision of the Genus Eurema—Part II. New World Species, Taxonomy and Synonymy, Klots. 73 pp., 101 figs. 1929	$ 1.00
Synopsis of the Principal Larval Forms of the Coleoptera, Boving & Craighead. cloth bound, 351 pp., 125 plates. 1930–31.	$10.00
The Nearctic Social Wasps of the Subfamily Polybiinae, Bequaert. 63 pp., 8 figs. 1933	$ 1.00
Revision of the Epistrophe Flies of America North of Mexico, Fluke. 57 pp., 45 figs. 1935	$ 1.00
The Biology and Taxonomy of the Genus Trichiotinus, Hoffmann. 76 pp., 20 figs. 1935	$ 1.00
A Review of the Genus Cyrtopogon in North America, Wilcox and Martin. 95 pp., 58 figs. 1936	$ 1.00
Bibliography of the Described Life Histories of the Rhopalocera of America North of Mexico, Davenport and Dethier. 40 pp. 1937	$ 2.50

Monographs from Entomologica Americana

The American Patrobini, Darlington. 48 pp. 1938	$ 1.00
A Synopsis of the Hemiptera-Heteroptera of America North of Mexico—Part II. Coreidae, Alydidae, Corizidae, Neididae, Pyrrhocoridae and Thaumastotheriidae, Torre-Bueno. 81 pp. 1941	$ 3.00
A Monograph of the Genus Chyphotes of North America, Buzicky. 40 pp., 13 figs. 1941	$ 1.50
A Monograph of the Melophaginae, or Ked-Flies of Sheep, Goats, Deer and Antelope, Bequaert. cloth bound, 210 pp., 18 figs. 1942.	$ 5.00
Selection of Colored Lights by Night-Flying Insects, Milne and Milne. 65 pp. 1944	$ 1.50
A Revision of the North American Species of the Genus Carabus, Van Dyke. 50 pp., 24 figs. 1944	$ 1.50
The Genus Phyciodes, Forbes. 69 pp., 85 figs. 1944	$ 1.50
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Notes and Keys on the Genus Brochymena, Ruckes. 95 pp., 41 figs. 1946	$ 2.00
Female Genitalia of Culicidae, with Particular Reference to Characters of Generic Value, Coher. 38 pp. 1948.	$ 2.00
The Scutate Ticks, or Ixodidae, of Indonesia, Anastos. 144 pp., 28 figures. 1950.	$ 5.00
The Tingoidea of New England and their Biology, Bailey, 140 pp., 6 figs. 1951.	$ 5.00
The Hippoboscidae or Louse-Flies of Mammals and Birds, Part I. Structure, Physiology and Natural History, Bequaert, 442 pp., 21 figs., 1952–53.	$10.00
Part II. Taxonomy, Evolution and Revision of American Genera and Species. 611 pp., 83 figs. 1954–56.	$15.00

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BULLETIN
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BROOKLYN ENTOMOLOGICAL SOCIETY

VOL. LIV OCTOBER, 1959 No. 4

THE GENERIC NAME OF THE NORTH AMERICAN "LYGUS" BUGS (HEMIPTERA: MIRIDAE)

By JAMES A. SLATER[1]

Recent North American literature shows that confusion is developing over the correct generic name to be applied to the important economic taxon known to most workers as the "Lygus Bugs" which contains such well known species as the Tarnished Plant Bug and the western legume bugs.

The generic name of the taxon is *sub judice* with the International Commission on Zoological Nomenclature and has been for several years. However, since the commission has not acted to date and may not act for some time, it seems desirable to review the status of the generic name. This seems particularly necessary as at least three recent papers (Guppy 1958, Phillips 1958 and Kelton 1959) have used the name *Liocoris* for the "Lygus" bugs. It is the purpose of the present paper to demonstrate that the former name *Lygus* should be used.

In the years 1953–1955 Dr. L. Kelton of the Canadian National Museum produced a very commendable study of the group of genera to which the economic "lygus" bugs belong. This was a detailed piece of work utilizing male and female genitalia and based upon an excellent sample of the known species. Kelton's work is a forward step in our knowledge of a very complex unit, and I believe most students are in general agreement with the conclusions.

In the course of his work Kelton concluded that the genus *Lygus* (in the sense of *pratensis* L.) was congeneric with the European species *Liocoris tripustulatus* (F.). Unfortunately the name *Liocoris* is older than *Lygus* and if the genera were to be combined, the name *Liocoris* would have to be used. It was also shown by other workers (China, Leston *et al*) that the type species of *Lygus*

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[1] Dept. of Zoology and Entomology, Univ. of Connecticut, Storrs.

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was not congeneric with our economically important North American species. For both of the above reasons it seemed that unless arbitrary legal action were taken the name *Lygus* would be lost in the sense understood by most North American workers. The probability of this loss led to the formulation of a petition to the International Commission on Zoological Nomenclature to use its plenary powers to retain the generic name *Lygus* for the group of species to which the Tarnished Plant Bug and its allies belong. This petition was originally prepared in 1954 by Drs. Usinger and Carvalho and sent to most of the interested taxonomists of the world asking them either to join in authorship of the appeal or to formally support it, if they agreed with the undesirability of losing the name "Lygus" for a group of species to which it was being applied, not only as a latin generic word, but also as a common English term. Professsor H. H. Knight joined in authorship and there was, so far as I know, unanimous agreement as to the desirability of the petition. It was supported by a number of hemipterists including Dr. Kelton. The petition was widely circulated, reworded and revised several times and sent to the International Commission on December 9, 1955. Dr. Usinger in his covering letter to Mr. Hemming stated ". . . The petition is supported by two co-authors and by the ten persons in the world most directly concerned with this subject. I do not know of anyone who is opposed to it as it now stands. . . . Thus the present petition is a truly international document and an excellent example of cooperation among scientists to solve a nomenclatural problem."

The name *Lygus* therefore became *sub judice* at that time and for all practical purposes from a year prior to that time as all active Hemipterists were kept fully informed of the forthcoming petition for a year prior to the formal filing of the petition. It is, of course, considered highly objectionable (See Code of Ethics discussion in Bull. Zool. Nomen. 4: 234–5, Conclusions 4(3 a, b.)). to alter the use of a name that is *sub judice* particularly when there appears to be no opposition to the action requested of the International Commission. Kelton (1955a, 1955b, 1955c) when he formally published his findings used the name *Liocoris* for the economic group of species to which the Tarnished Plant Bug belongs. Kelton was fully aware of the proposed petition as is evidenced by his footnote on page 531 of his third paper (1955c).

It seems likely that these papers plus determinations that have been appearing under the name *Liocoris* have brought this generic name into use for our North American species in the last several years.

In addition to the undesirability of abandoning a generic name during the period in which an appeal for its retention is pending before the International Commission, Wagner (1957) has challenged the congeneric nature of *Liocoris* and *Lygus* (*sensu pratensis*) on systematic grounds and discusses in much detail the distinct generic nature of the two taxa.

Without attempting to enter into the merits of whether one or two genera are involved it seems clear that the name *Liocoris* is not destined to continue in use for the North American "Lygus bugs." The name will almost certainly be abandoned either because of action by the International Commission on Zoological Nomenclature or because of taxonomic separation of *Liocoris* and *"Lygus,"* or both.

Therefore it appears highly desirable for economic and systematic entomologists to use the generic name *Lygus* for the North American "lygus-bugs" and to withhold use of the name *Liocoris* in publications and determinations at least until formal action upon the Carvalho, Knight and Usinger petition has been taken.

LITERATURE CITED

Guppy, J. C. 1958. Insect surveys of clover, alfalfa and birdsfoot trefoil in eastern Ontario. Can. Ent. 90: 523–531.

Kelton, L. A. 1955a. Genera and subgenera of the *Lygus* complex (Hemiptera: Miridae). Can. Ent. 87: 277–301.

——— 1955b. New species of *Liocoris* from North America (Hemiptera: Miridae). Can. Ent. 87: 484–490.

——— 1955c. Species of *Lygus, Liocoris,* and their allies in the prairie provinces of Canada (Hemiptera: Miridae). Can. Ent. 87: 531–566.

——— 1959. Male genitalia as taxonomic characters in the Miridae (Hemiptera). Can. Ent. 91: (Supp. 11): (i–ii) + 3–72.

Phillips, J. H. H. 1958. The Tarnished Plant Bug (*Liocoris, lineolaris* (Beauv.) Hemiptera: Miridae) as a pest of peach in Ontario. A progress report. Ann. Rept. Ent. Soc. Ontario 88: 44–48.

Wagner, E. 1957. Das Lygus-Liocoris-Problem. (Hem. Het. Miridae). Deut. Ent. Zeit. 4: 91–94.

HOT SAND INFLATION FOR SMALL INSECTS AND SPIDERS

By Ruth A. Flint[1], Amherst, Mass.

Spiders, aphids and immature Hemiptera often shrivel badly when mounted dry and so are usually preserved in liquid. The hot sand method inflates them, drying the integument and tissues so that shrinkage is reduced to a minimum. The colors are scarcely affected although the usual fading in time will occur. The technique is essentially that described by Nathan Banks in *Directions for Collecting and Preserving Insects* (Smithsonian Institution Bulletin 67: 70, 1909). The method was then described as somewhat useful for micro-Lepidoptera larvae, too small to eviscerate.

The specimen should be placed on hot sand. The most satisfactory temperature is 140°C. A metal disc thermometer is less apt to break than a glass mercury one. Experimentation showed that temperatures above 140°C will singe or burn the specimen while those below will not inflate the body quickly enough. Inflation is most easily accomplished with the specimen placed on the dorsum since the legs, which are more susceptible to burning, prevent direct contact with the hot sand when placed on the venter. The specimens will inflate visibly. When the movement has stopped they should be left there from a few seconds to two minutes depending upon the size of the specimen, and then removed from the heat. If specimens start to shrink when removed from the heat, they should be returned immediately to the hot sand and left there for a few more seconds.

The inflated specimens may then be pointed. Specimens too large to point should be killed or anaesthetized and pinned, then put on hot sand by pushing the head of the pin into the sand until the specimen rests on the sand.

Small insects are the most satisfactory for this method of inflating although larvae an inch long and spiders of greater size have been preserved in this way. These larger specimens require a longer time, but not a higher temperature. Living specimens inflate most satisfactorily but ones killed in cyanide or ethyl acetate less than an hour before treatment will inflate fairly well.

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[1] Now at Department of Entomology, Cornell University, Ithaca, New York.

A NEW SPECIES OF GLAUCIAS KIRKALDY FROM NEW GUINEA (HETEROPTERA: PENTATOMIDAE)

By Herbert Ruckes[1]

Among the many insects collected during the Fifth Archbold Expedition to New Guinea in 1956, conducted under the auspices of the American Museum's Department of Mammals, the following striking new species of the Australasian genus *Glaucias* Kirkaldy has appeared. While there is only one specimen at hand, that one is so distinctive and spectacularly colored that it warrants a name and place of its own.

Glaucias spectabilis, n. sp.

Oval, robust, large (17.5 mm. long), semiglossy, and quite convex dorsally; punctures fine to medium in size, sparsely distributed except on the hemelytra, and concolorous with the background; above testaceous with black margins as hereinafter specified; below paler testaceous anteriorly, darker so posteriorly; antennae entirely piceous.

Head slightly longer than wide between the eyes (115 × 110), flattish, transversely and obliquely finely rugose as is typical for the genus; margins conspicuously piceous, moderately sinuate before the eyes, then convexly curved to a moderately rounded apex; juga slightly longer than the tylus, leaving a shallow, rectilinear sinus apically, tip of tylus piceous; eyes with a purplish cast, ocelli large, bright topaz and almost three times as far apart as distant from the eyes; antennae more than half of the length of the body, all segments piceous and clothed with a dense cover of golden setae; segmental ratios: 30/60/90/110/105, i.e., segment II twice as long as one and two-thirds as long as III, segment IV the longest; external denticle of the antennal tubercle and a small blotch above it, piceous.

Pronotum not quite two and a half times as wide across the humeri as long medially (390 × 160); anterior margin shallowly excavated, subcalloused, subtruncate centrally, then obliquely truncate behind the eyes, a small, punctured, piceous spot at its middle; anterolateral margins straight, and conspicuously piceous both above and below; humeri slightly tumid with a large fuscous to piceous, circular patch near each lateral angle; punctures mixed, both fine and medium, for the most part concolorous, a few of the central ones showing reddish tints.

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[1] Research Associate, Department of Insects and Spiders, the American Museum of Natural History, and Professor Emeritus, the City College of New York.

Scutellum about as long as wide at the base (160 × 155), the punctures concolorous, the coarsest ones more centrally placed, rather wide-spaced; basal angles neither calloused nor foveolate; a large elliptical fuscous to piceous patch on each margin just before the apex; apex moderately rounded. Hemelytra more densely and uniformly punctured than other parts, the basal third of the costal margin conspicuously piceous; membrane hyaline, uncolored, veins numerous and subparallel. Connexivum exposed, the extreme margin and apical half of each segment piceous, the basal half dark testaceous; apical segmental angles rectilinear and slightly produced.

Under surface of head and thoracic pleura very finely and densely concolorously punctured; lateral portion of the abdomen finely rugulose, as is typical for the genus. Mesosternum with a well-defined, but not high, carina which is uniform in diameter throughout. Metasternum mildly elevated into a flat-topped, hexagonal plate, perceptibly narrowed posteriorly and obsolescently notched there. Median abdominal tubercle short, stout, and reaching the metasternum. Coxae and trochanters pale yellowish, femora bright green becoming piceous apically, tibiae and tarsi piceous with a dense golden-setose cover. Rostrum reaching the abdominal tubercle, basal three segments pale, apical one fuscous; segmental ratios: 50/80/70/60, i.e., segment II the longest, the last three segments becoming progressively shorter. Spiracles concolorous. Apical third of each abdominal submargin provided with a large piceous triangle.

Basal plates of the female genital valves roundly triangular, each a little wider than long, with the inner apical area of each bearing a large fuscous patch on its crest.

Described from one specimen.

Holotype: Female: 17.5 mm. long, 9.75 mm. wide across the humeri. Abaleti, Rossel Island, Papua, New Guinea; September 29, 1956 (J. L. Brass). Deposited in the American Museum of Natural History.

Apparently a relative of *Glaucias ludekingii* (Vollenhoven), based on the similarity of the construction of the mesosternum, and metasternum, the equivalent ratios of both antennal and rostral segments, the length of the rostrum, the form and size of the basal abdominal tubercle, the presence of two large piceous patches near the apex of the scutellum, the broad black margins of the head, anterolateral margins of the pronotum and the apical portions of the abdominal segments, the piceous antennae, tibiae and tarsi, and the green femora. In contrast with Vollenhoven's type, the species *spectabilis* differs in being more convex and more glossy dorsally, with finer puncturation, as well as being entirely differently colored. The distinguishing characteristics that set this new species off from others in the genus are the striking yellow and black contrasting combination of colors, the incised nature of the apex of the head, and the very large topaz ocelli.

NOTES ON POMPILID WASPS THAT DO NOT DIG BURROWS TO BURY THEIR SPIDER PREY

By B. J. Kaston[1]

For a number of years, in the course of collecting and studying spiders themselves, I have been accumulating data on spider parasites. Brief articles on dipterous and mermithid parasites have already been published by me (Kaston, 1937, 1945) but as yet my notes on the hymenopterous parasites have not been completed.

The best known and most commonly reported parasites are the ichneumons belonging to *Polysphincta* and related genera. The larva of the parasite can be seen attached to the outside of the spider's body, in most cases on the abdomen of the host. This is in marked contrast to the situation when the parasite is a dipteron, whose larva feeds *within* the body of its host. Consequently, any spider found with a larva, or the egg of a parasite, on the outside of its body was assumed by me to be parasitized by an ichneumon. In many cases, because of the small size of the parasite the spider was not saved alive at the time of collection, since the parasite was not then noticed. In such cases the parasite would come to my attention only when the spiders were brought out later for study, after they had been preserved in alcohol. In other cases, even though the spider and its parasite may have been kept alive in the laboratory for a time, I was unsuccessful in rearing the parasite to maturity. One that I did succeed in rearing turned out to be, much to my astonishment, not an ichneumon, but a pompilid wasp.

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[1] Central Connecticut State College, New Britain, Conn.

Now, I had known of pompilid wasps stinging spiders and carrying them off to be buried. Although a few exceptions to this behavior have been known for many years for the Old World fauna, it is only recently that we have come to learn that comparable cases occur in the New World too, and they are less rare than previously supposed. In effect, a non-sedentary spider (most often a lycosid) may be parasitized in the manner of a *Polysphincta,* where the host quickly recovers from the wasp's sting, and continues to run about, apparently normally, for an extended period of time. The discovery that a pompilid wasp, and not an ichneumon, may be the parasite prompted me to recheck my notes, with a view to finding other instances. I was able to find ten other cases, although in these the parasite was not reared. Except for one case the spiders were all collected by myself. I have been stimulated to prepare my notes for publication by the extensive studies of Krombein, and of Evans. The latter's essay on the comparative ethology of spider wasps (1953) is a particular interesting and valuable contribution to this field.

Report of Cases of Pompilid Parasitism

No. 1. The spider, a young lycosid (my number 957) was collected at Gainesville, Georgia, on May 14, 1945. Attached to the right side of its abdomen was a small grayish-white larva. Upon returning to the laboratory the spider was placed in a small container, with the expectation of rearing the parasite. Examination on the following day revealed no change, but on May 16th at 8: 30 A.M. I found that the spider had succumbed during the night preceding and the larva, now greatly enlarged, was engaged in consuming the remains of the corpse. By 3: 30 P.M. it appeared to have completed its feeding, and at about 8: 30 P.M. the larva began to spin its cocoon. By 8: 30 the following morning the cocoon was completed. It was elliptical, 9.1 mm. long, 4.1 mm. at its widest diameter, and was transparent enough at first so that movements of the prepupa could be discerned within. The cocoon later changed to opaque silvery-brown, and here and there over the surface, in amongst the long threads, could be seen brown specks which were fragments of the spider's cuticle that the larva had incorporated in the structure. By the next day it had pupated, and one end of the cocoon appeared dark because of the meconial discharge showing through (Fig. 9). The imago, a male, emerged on June 9, after cutting a circular "lid" at the top of the cocoon. It was subsequently identified by H. Townes as *Minagenia osoria* (Banks).

No. 2. The spider, a very young lycosid (my number 946)

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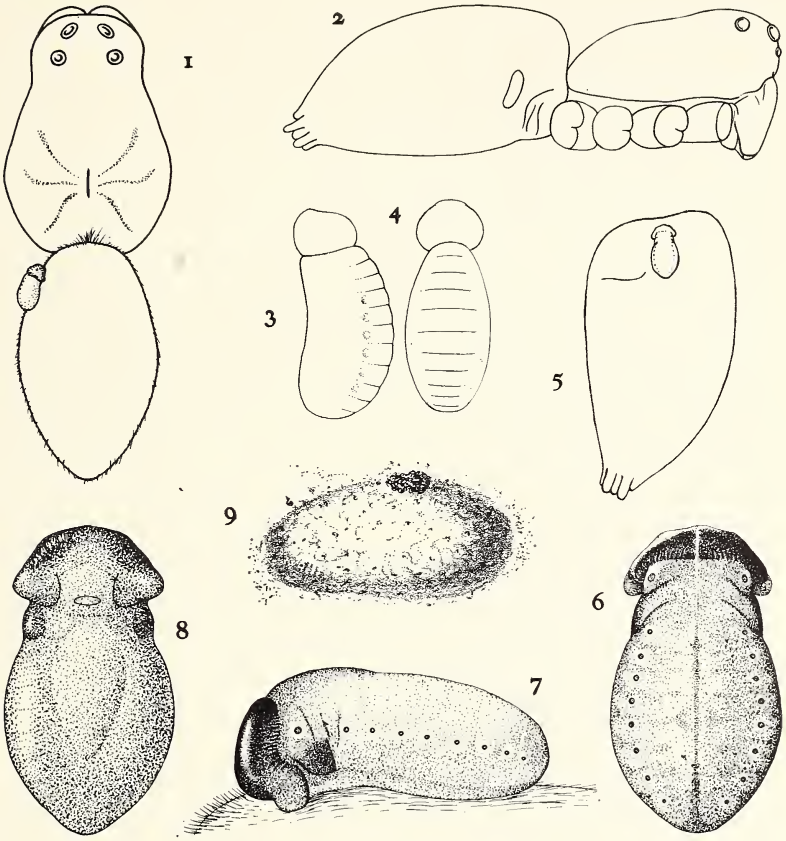

EXPLANATION OF PLATE

Fig. 1. Dorsal aspect of *Lycosa frondicola* #912, showing the parasite larva attached to the left side of the spider's abdomen. Fig. 2. *Lycosa punctulata* #838, from the right side, showing egg of parasite. Fig. 3. Lateral aspect of newly hatched larva on #838. Fig. 4. Dorsal aspect of newly hatched larva on #838. Fig. 5. Abdomen of *Lycosa frondicola* #856, from the left, showing parasite larva. Fig. 6. Dorsal aspect of parasite from #856. Fig. 7. Lateral aspect of parasite from #856. Fig. 8. Ventral aspect of parasite from #856. Fig. 9. Pupal cocoon of *Minagenia osoria* (Banks) #946.

was collected at Gainesville, Georgia, on September 19, 1940, and brought into the laboratory for rearing of the parasite. As in the preceding case, there was a small grayish-white larva attached to the right side of the abdomen. For the next three and a half months the spider behaved normally, molting on September 29, October 13, November 4, and November 19. I observed that each time the spider molted it failed to shed the portion of its cuticle where the parasite was attached.

On December 16 I noticed that the larva, which up to then had grown hardly at all, now appeared to be considerably inflated. While previously the head had been relatively quite wide the greatly increased size of the trunk segments made the head now appear relatively narrower. On the evening of December 18 the parasite appeared to be beginning a molt, with the old cuticle splitting at the anterior region. By 6 P.M. on December 19 the exuviae had been pushed back to the posterior end. In this instar the parasite's head was relatively much narrower than in the previous one. During the next few days the parasite grew steadily larger, but the spider did not appear in the least inconvenienced. I had this spider and parasite with me at the Christmas meetings of the entomologists in Philadelphia, and showed the specimens to ichneumonologists R. A. Cushman and H. D. Pratt. Neither one could recognize the parasite, nor even venture a suggestion as to the group to which it belonged.

On the morning of January 1, 1941 I found that the parasite had molted again during the preceding night, and by 10:30 A.M. the spider appeared dead. By 3 P.M. the larva had completely consumed the spider's abdomen, and by 4:30 the cephalothorax and legs too. At midnight, the larva, now about 8 mm. long, began spinning its cocoon. At 9 A.M. on January 2 the cocoon was complete, about 8.5 mm. long by 4 mm. at its widest diameter. It was quite similar to that described for #957 (above) including the bits of spider débris strewn about on the outside (Fig. 9). Unfortunately the specimen failed to emerge, but on opening the cocoon in July I found a fully developed and fully pigmented male. Apparently it had died quite close to the time for it to emerge. It was subsequently determined by H. Townes (1957) as the same species as my #957.

Since this parasite had been collected in an early instar, and I had noted especially its peculiarly wide head, it occurred to me to look through my other parasite material for similar larvae (which had been preserved). Several were found and in each case the host turned out to be a non-sedentary, running spider. It seems obvious that all these likewise represent cases of parasitism by pompilids.

No. 3. The spider, a mature female *Lycosa punctulata* Hentz (my number 838) was collected by me at Killingworth, Connecticut, on June 23, 1935. It was seen to have the egg of a parasite attached to the right side of its abdomen (Fig. 2), and so was kept alive in the laboratory. The egg measured 1.5 mm. in length and 0.54 mm. at its widest diameter. The upper pole was a pale translucent pearly gray, the lower pole faintly yellow, and the remainder, white. On June 26 the gray area extended down to occupy the upper third of the egg.

On June 27 the larva appeared to have hatched and it could be seen that the head was white, and rather sharply set off (Figs. 3 and 4). It was possible to make out 11 brownish segments, the three thoracic and eight abdominal. Of these latter the last two were very indistinct, and the first six bore faint indications of paired spiracles. On June 28 the larva was 2.25 mm. long and 0.92 mm. wide. Unfortunately I accidentally injured the larva in handling the specimens and it died.

No. 4. The spider, a mature female *Lycosa frondicola* Emerton (my number 881) was collected at Bethany, Connecticut, on September 25, 1937. Attached to the right side of the abdomen, near the venter, was an elliptical white egg measuring 2.1 mm. in length and 0.75 mm. at its greatest diameter. On September 27 the egg hatched, and as in the preceding case (#838 above) the larva showed a white head, well set off from the darker body. On September 29 at 9 A.M. it was found that the larva had dropped off the spider and was dead.

No. 5. The spider, a young male *Schizocosa saltatrix* (Hentz) (my number 345) was collected at Southbury, Connecticut, on April 30, 1933. It was bearing a small grayish-white larva attached to the left side of the abdomen. The spider molted on May 26, and again on June 13 (to maturity). It remained alive until July 21, and in all this time no change in the size of the parasitic larva was detectable.

No. 6. The spider, a male *Pisaurina mira* (Walckenaer) (my number 883) was collected at Roxbury, Connecticut, on September 26, 1937. On the right side of its abdomen was a small grayish-white larva. The spider died on September 28.

The remaining cases to be cited are those in which the parasite was not noticed when the spider was collected, but only when the spider was taken out of preserving alcohol for study.

No. 7. The spider, a nearly mature female *Lycosa frondicola* Emerton (my number 856) was collected at West Ossippee, New Hampshire, on July 25, 1936. Attached to the left side of the abdomen was a parasite larva (Figs. 5, 6, 7, 8). It was 1.1 mm. long and 0.6 mm. at the widest part of the abdomen. The head was quite well set off, dark and shiny. The segments of the trunk were faintly indicated, and a pair of spiracles could be seen on the prothorax as well as on the eight abdominal segments.

No. 8. The spider, a young female *Schizocosa saltatrix* (Hentz) (my number 857) was collected at Mt. Carmel, Connecticut, on April 19, 1935. A parasite larva exactly like that of #856 (above) was attached in the same position on the spider's abdomen. However, this larva was smaller, being only 0.7 mm. long and 0.39 mm. wide.

No. 9. The spider, a young female *Schizocosa saltatrix* (Hentz) (my number 861) was collected at Wilsonville, Connecticut, on April 18, 1937. The parasite larva looked exactly like those of #856 and #857 (above) but was attached on the right side of the spider's abdomen, instead of the left. It measured 0.84 mm. in length and 0.45 mm. in width.

No. 10. The spider, a young female *Lycosa frondicola* Emerton (my number 912) was collected at Mt. Carmel, Connecticut, on September 3, 1939. The parasite larva looked exactly like those on #856, #857, and #861 (above) and was on the left side of the spider's abdomen (Fig. 1). It measured 0.82 mm. in length and 0.43 mm. in width.

No. 11. The spider, a young lycosid (my number 976) was collected by H. W. Levi in Pitkin County, Colorado, on July 20, 1954. It was carrying an ellipsoidal white egg fastened to the right side of its abdomen. The egg measured 1.75 mm. in length and 0.6 mm. at its greatest diameter.

Discussion and Review of the Literature

In theorizing on the evolution of pompilid habits Emery (1894) suggested that the original members of this family merely fastened an egg on to the body of the prey but left the latter where they found it instead of dragging it off to bury it. Others, including Iwata (1942) have likewise implied that this is a primitive type of behavior. But Evans (1953) has given good reasons for believing, rather, that this trait of not burying the prey represents highly specialized behavior. As has been shown by Krombein (1953a), this habit is associated with the wasp's inflicting on the spiders only a short span of paralysis so that the spider recovers rapidly and moves about as before, except that it now carries the egg (and later, the larva) of the wasp.

Perhaps the best known of these wasps are the members of the genus *Homonotus*. The life history of the European species, *sanguinolentus* Fabricius, was first given (sub *Salius*) by Kryger (1910), but amplified in great detail, and with excellent illustrations, by Nielsen (1936). The host spider is *Chiracanthium carnifex* (C. L. Koch), a species which gathers blades of grasses, or leaves of heather and similar low growing plants, to construct a silken-lined retreat in which it will lay its eggs. The wasp forces its way into the retreat, stings the spider and lays an egg on the spider's abdomen. The spider's retreat thus serves as a place of concealment for the developing larva, and for the pupal cocoon. A similar account has been given by Iwata (1932, 1942) for *Homonotus iwatai* Yasumatsu parasitic on *Chiracanthium rufulum* Kishida, and excellent photographs are supplied by Yaginuma (1956) of the spider, *C. japonicum* (Bösenberg & Strand), of its nests, and of the wasp, *H. japonicus*.

A somewhat similar situation exists, as shown by Williams (1928), with the wasp *Notocyphus tyrannicus* Smith and the tropical theraphosid *Tapinauchenius*. This arboreal tarantula constructs a nest by folding leaves about five or six feet up in a tree, the same nest serving for the developing parasite too.

Hartman (1905) reported his observations in July of a pompilid attacking a spider on its web, laying an egg and then leaving the spider. The imago that emerged in late August was not identified as to species, nor was the spider identified. However, from the description of the position of the web, in a corner of the verandah, and from Hartman's account of the wasp "dragging the spider backwards over its own web" it seems probable that the spider was one of the synanthropic agelenids (e.g., of the genera *Coras, Tegenaria, Agelenopsis,* etc.) which construct a more or less horizontal sheet, over which they run in an upright (not inverted) position.

Cocoons made by a wasp of similar habits were collected by J. M. Hollister from sheet webs at Melbourne, Florida (see Cushman, 1942). Although Hollister described the webs as "sheet" rather than "funnel", implying that the spiders were not agelenids, but possibly linyphiids, it should be emphasized that the webs of some agelenids do not show the funnel very clearly. I am of the opinion that the host spiders were agelenids, or possibly even the atypical lycosid, *Sosippus floridanus* Simon, which is known to construct close-to-the-ground webs like those of the Agelenidae.

The European cribellate spider, *Eresus cinnabarinus* (Olivier), constructs a sheet web connected to plants close to the ground, and attached by threads to a silk-lined vertical burrow extending into the ground. Bertkau (1878) reported finding in July several specimens that were parasitized, each with a larva on its abdomen. The imagines emerged from their cocoons in August and proved to be *Pompilus coccineus* Fabricius (= *Paraferreola rhombica* Christ.). In 1892 van Hasselt, in reviewing the literature on spider parasites, mistakenly reported this wasp as having been reared from the egg sacs of the spider.

Although the parasite was not reared, I believe that the hymenopter referred to by Muma (1945) was likewise a pompilid. Muma found a large pupal cocoon next to the remains of a female *Atypus bicolor* Lucas in its web.[2] As is the case in *Eresus, Atypus* constructs a vertical burrow lined with silk and has an extension of the silk (i.e., the elongated "purse" shaped portion of the web) above ground for a short distance.

From attacking spiders on their webs close to the ground it is but a short step to attacking them inside their burrows in the ground. Jenks (1938) presents a graphic account, with photographs, of the life cycle of *Psorthaspis planata* (Fox), whose host is the trap-door spider, *Bothriocyrtum californicum* (O. P.-Cambridge). The wasp enters the burrow to sting the spider and then leaves, after laying its egg on the spider's abdomen. Another ctenizid, *Aptostichus stanfordianus* Smith is parasitized by *Planiceps* (= *Aporus*) *hirsutus* (Banks), which, according to Williams (1928), first opens the trap-door, lures the spider from its burrow, stings it, drags it back into its burrow, and then leaves after placing an egg on the spider's body. In a later paper (1956) Williams reported pepsine wasps stinging, and ovipositing on, tarantulas[3] right in their shallow burrows and covering them there.

According to Evans, Adlerz (1910b) reported that the European wasp, *Pompilus* (*Anoplochares*) *spissus* Schiødte, enters the burrow of certain species of *Tarentula*,[3] stings the spider, lays its egg, then leaves and closes the entrance of the burrow. Judging from the observations of Fabre (1883) on *Pompilus apicalis* van der Lind, and (1890) on *Calicurgus annulatus* (Fabricius), as first reported by Emery (1894) and later by Sharp (1901), the closing of the burrow is a matter of merely moving into place a few loose stones from the vicinity of the burrow.

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[2] Private communication.

[3] A "tarantula" is a member of the Theraphosidae, while *Tarentula* is a genus of wolf spiders (Lycosidae). In each group there are members that build shallow temporary burrows.

Lichtenstein (1869) reported collecting a spider carrying the larva of a parasite which he took for an ichneumon. The spider was not identified, but from the information supplied it was without question a ground-running form, not a snare-builder, and I would suppose it to have been a lycosid. According to Sharp the parasite was afterward ascertained to be a *Calicurgus hyalinatus* (Fabricius). Other European prey records for this wasp include *Araneus cucurbitinus* Clerck (Bristowe, 1941), and Krombein (1958) found the American subspecies *alienatus* Smith dragging a paralyzed *Neoscona* sp. It would appear, therefore, that with the closely related species of *Calicurgus* we may see displayed a variety of behavior patterns from the typical dragging of the prey to a nest the wasp will dig, or just closing up the burrow in which the wasp finds the spider, to ovipositing on a spider which is left to run about freely.

Similar variation of behavior appears to occur in *Anoplius marginalis* (Banks) which is known, for the most part, to dig a burrow. Yet Krombein (1953a) reported this species attacking a burrowing wolf spider, *Geolycosa pikei* (Marx), near the mouth of the spider's burrow, then dragging the spider into the burrow. At another time he saw the same species of wasp enter the burrow and attack the *Geolycosa* inside its burrow (1953b). Presumably the wasp is satisfied to use the burrow of its host instead of digging its own, which it can very well do.

The very first published account of an identified pompilid reared from an identified spider was that of Karsch (1872). He collected, in July, a female *Tarentula inquilina* (Clerck) which he brought into the laboratory. The spider appeared not at all disturbed by the presence of the parasite, but eventually the latter killed its host, pupated, and emerged in mid-August as a *Pompilus fuscus* (Fabricius) (= *Priocnemis trivialis* Klug?). Karsch also reviewed the data given by Menge (1866) and came to the conclusion that the latter probably had the same species of wasp, although in Menge's case the host spider was a female *Arctosa cinerea* (Fabricius). Even though Menge was unsuccessful in rearing the parasite, his drawings show the young larva with a large head and narrow neck, somewhat as in the drawings of my specimen (Figs. 3 and 4), and show the older larva with a much less conspicuous head. It was certainly not a dipteron, as Menge supposed. Adlerz (1910a), reviewing the literature, agreed with Karsch.

Lichtenstein and Rabaud (1922) cite this type of parasitic habit as "accidental" for pompilids, though usual for *Polysphincta*. I have searched the literature and my own records, and am unable to find a single instance of dipterous parasitism where the larva is *external,* nor a single instance of a polysphinctine ichneumon reared from a lycosid. I feel, therefore, that it is safe to assume that not only was Menge's parasite a pompilid, but so also were those reported from a *Lycosa* by Sanborn (1871), who thought he had a dipteron, and from a *Pardosa luteola* Marx (= *hyperborea* Thorell) by Howard (1892), who thought he had a *Polysphincta.*

REFERENCES CITED

(Those indicated by an asterisk were not seen by me)

Adlerz, G. 1910a. Stekellarver som ytterparasiter på fritt kringströfvande spindlar. Entom. Tidskr. 31: 97–100.

*———— 1910b. Lefnadsförhållenden och instinkter inom familjerna Pompilidae och Sphegidae. Part III. K. Svenska Vet.-Akad. Handl. 45 (12): 1–75.

[Bertkau, P.] 1878. [Notes] in: Sitzber. d. Niederrheinischen Ges. Bonn for 1877, pp. 177–179.

Bristowe, W. S. 1941. Comity of spiders. II. Ray Soc., London, pp. 353–359.

[Cushman, R. A.] 1942. [Notes from minutes of the 529th regular meeting of the Society] Proc. Ent. Soc. Washington 44: 184.

Emery, C. 1894. Ueber Enstehung des Soziallebens bei Hymenopteren. Biol. Centralbl. 14: 21–23.

Evans, H. E. 1953. Comparative ethology and the systematics of spider wasps. System. Zool. 2(4): 155–172.

***Fabre, J. H.** 1883. Les pompiles. Souvenir Entomol. 2: 217–237.

*———— 1890. Méthode des calicurgues. ibid., 4: 269–286.

Hartman, C. 1905. Observations on the habits of some solitary wasps. Bul. Univ. Texas, no. 65, Science ser. 6, pp. 1–72.

Howard, L. O. 1892. Hymenopterous parasites of spiders. Proc. Ent. Soc. Washington, II: 290–303.

***Iwata, K.** 1932. Biology of *Homonotus iwatai* Yasumatsu. Contrib. Ent. Lab. Kyoto Imperial Univ., no. 21, pp. 305–317.

———— 1942. Comparative studies on the habits of solitary wasps. Tenthredo 4: 1–146.

Jenks, G. E. 1938. Marvels of metamorphosis. National Geogr. 74(6): 807–828.

Karsch, F. 1872. Beitrag zur Naturgeschichte der Mordwespengattung *Pompilus.* Ztschr. f. gesam. Naturw., N.F., V: 441–452.

Kaston, B. J. 1937. Notes on dipterous parasites of spiders. J. New York Ent. Soc. 45: 415–420.

———— 1945. Notes on nematode parasites of spiders. Trans. Connecticut Acad. Sci. 36: 241–244.

Krombein, K. V. 1953a. Biological and taxonomic observations on the wasps in a coastal area of North Carolina. Wasman J. Biol. 10(2) : 257–341.

———— 1953b. Kill Devil Hills wasps, 1952. Proc. Ent. Soc. Washington 55(3) : 113–135.

———— 1958. Miscellaneous prey records of solitary wasps. III. Proc. Biol. Soc. Washington 71: 21–26.

Kryger, J. P. 1940. Snyltere i Edderkoppeaeg. Entom. Meddel. 3: 257–285.

[Lichtenstein, J.] 1869. [Notes] in Ann. Soc. Ent. France, ser. 4, t. 9, Bulletin, pp. lxxii–lxxiii.

Lichtenstein, J. L. and **E. Rabaud** 1922. Le comportment des *"Polysphincta"*. Bul. Biol. France et Belge 55: 269.

Menge, A. 1866. Preussische Spinnen. I. Schr. Naturf. Ges. Danzig, N.F. I(4) : 37–39.

Muma, M. and **K. E.** 1945. Biological notes on *Atypus bicolor* Lucas. Ent. News 56: 122–126.

Nielsen, E. 1936. The biology of *Homonotus sanguinolentus* Fabr. Entom. Meddel. 19: 385–404.

[Sanborn, F. G.] 1871. [Notes from report of meeting] Proc. Boston Soc. Nat. History 14: 388.

Sharp, D. 1901. Insects, part II. Cambridge Nat. Hist. 6: 106.

Townes, H. 1957. Nearctic wasps of the subfamilies Pepsinae and Ceropalinae. U.S. Nat. Mus. Bul. 209, pp. 220–237.

[van Hasselt, A. W. M.] 1892. [Notes] in: Tijd. v. Entom. 35: xli.

Williams, F. X. 1928. Habits of some spider wasps of the family Pomilidae. Bul. Exp. Sta. Hawaiian Sugar Planters Assoc., Ent. series, 19: 128–143.

———— 1956. Life history studies of *Pepsis* and *Hemipepsis* wasps in California. Ann Ent. Soc. America 49(5) : 447–466.

Yaginuma, T. 1956. The enemies of spiders; in: The World of Spiders, Tokyo, pp. 38–39.

THE GENUS PARADASYHELEA MACFIE, WITH DESCRIPTIONS OF TWO NEW SPECIES FROM EASTERN AUSTRALIA (DIPTERA: CERATOPOGONIDAE)

By Willis W. Wirth[1] and David J. Lee[2]

The only previously known species of *Paradasyhelea* was recognized by Macfie in 1940 from Patagonia. Recent collecting in Australia has revealed two additional species which are herein described as new. A search of the literature has added a fourth species to the list, namely, *Dasyhelea egregria* Macfie (1932) from New Zealand.

Macfie (1940, *Ann. Trop. Med. Parasit.*, **34**: 17) erected the genus *Paradasyhelea* with *Dasyhelea brevipalpis* Ingram and Macfie as type, differentiating the genus from *Dasyhelea* on the characters "antennal segments not sculptured, 12–14 in male not binodose". In the original description of *brevipalpis* from Patagonia, Ingram and Macfie (1931, Diptera of Patagonia and South Chile, part II, fasc. 4, p. 178) point out a number of characters by which this species differs from *Dasyhelea,* and some in which it closely resembles the genus *Forcipomyia.* In searching the literature we find one other species which must be included in *Paradasyhelea;* this is *Dasyhelea egregria* Macfie 1932 from New Zealand. Both species are known only from males. We take this opportunity to describe two additional species which we have collected in New South Wales, and to offer additional characters of the genus including those of the female and of the pupa.

Genus *Paradasyhelea* Macfie

Male, female. Eyes widely separated above, finely but densely hairy all over. Clypeus with numerous long hairs. Proboscis very short, about half as long as height of a compound eye, mouth parts vestigial. Palpus four-segmented, the antepenultimate segment without a true sensory pit but with a cluster of long modified sensory hairs on distal third. Antenna fifteen-segmented. Female with first segment well-developed, in head capsule, with a

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[1] Entomology Research Division, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C., U.S.A.

[2] School of Public Health and Tropical Medicine, University of Sydney, New South Wales, Australia.

row of long hairs, second large and globular, third to fifteenth similar in shape and bristling, no great change between ten and eleven, each with basal whorl of verticils, five distal segments with scattered, long, peg-like sensoria, some of segments three to ten with very small, distal sensory pits surrounded by fine hairs. Male antenna with well-developed plume, segments neither binodose nor sculptured. Humeral pits on mesonotum well-developed; scutellum with numerous long hairs. Legs slender, without spines; hind tibia with oblique comb of four spines; hind basitarsus 1.3–1.9 times as long as second tarsal segment, fourth cylindrical, fifth without spines; claws small, equal, tips bifid in male; empodium minute, hair-like. Wing with costa short, not quite reaching middle of wing; both radial cells completely obliterated, radius appearing as a single straight vein in line with the oblique r-m cross vein; medial fork with long petiole; intercalary fork well-developed; anal angle very obtuse; microtrichia erect and minute, macrotrichia long and curved, abundant, and covering entire wing as in *Forcipomyia;* fringe well-developed, composed of a row of long straight hairs between two rows of shorter oblique hairs; alula with fringe. One sclerotized female spermatheca. Male genitalia with ninth sternum excavated posteriorly; ninth tergum well-developed with strong apicolateral processes; basistyles and dististyles of usual form; aedeagus with well-developed basal arch and slender median distal portion; parameres a narrow sclerotized band connecting ventral roots of basistyles, broken in mesal portion into a U-shaped or Y-shaped sclerite projecting cephalad.

Pupa. Elongate conical as in *Culicoides* and *Dasyhelea,* larval exuviae not attached, prothoracic respiratory organ a stalked, flattened horn about 5.5–7.5 times as long as broad, transversely wrinkled in mid-portion and bearing several dorsal papillae and a marginal row of papillae around apex. Metathorax almost completely divided in mid-dorsal line; anterodorsal, dorsolateral and dorsal tubercles (nomenclature of Carter, Ingram & Macfie, 1920, *Ann. Trop. Med. Parasit.,* **14**: 211–274; Lawson, 1951, *Trans. R. Ent. Soc. London,* **102**: 511–574) of cephalothorax large with well-developed spines; operculum with sparse granulations. Abdominal tubercles as in *Culicoides,* each with fine median hair; apicolateral processes of last abdominal segment directed at about 60 (*minuta*) to 90 (*albipunctata*) degrees to main body axis, short, and ending distally in a blade-like spine flattened perpendicularly to body axis; no bristle-bearing tubercle present on last segment as in *Dasyhelea.*

Discussion. All the known species are small brown midges well clothed with light and dark brown hairs, in one species with a distinct marking of white hairs forming a spot over the end of the costa on the anterior wing margin. Specific characters are found in the color and pruinosity of the thorax, presence of wing marking, relative length of the first and second hind tarsal segments, relative length of the antennal segments, size and shape of the female spermatheca, details of the male genitalia and coloration of the pupal respiratory organ.

Paradasyhelea resembles: (a) *Forcipomyia* in the vestiture of the wings, oblique r-m cross vein, hairy scutellum, broadly separated eyes, tarsal ratio (hind T_1/T_2) less than 2, presence of scattered, slender, hyaline sensory pegs on antenna, and structure of male gonostyles and parameres; (b) *Dasyhelea* in the four-segmented palpus, hairy eyes, short proboscis with rudimentary mouth parts, basal verticils present on all of segments three to fifteen, male antenna with last four segments elongated, vestigial empodium, and the shape of apicolateral processes of male genitalia; (c) *Culicoides* in the presence of well-developed humeral pits, presence of distal, minute sensory pits bordered by fine setae on certain antennal segments, distal antennal segment without terminal nipple, and Y-shaped aedeagus.

Paradasyhelea is unique in having both radial cells obliterated with costa extending less than half way to wing tip.

Paradasyhelea albipunctata Wirth and Lee, n. sp.

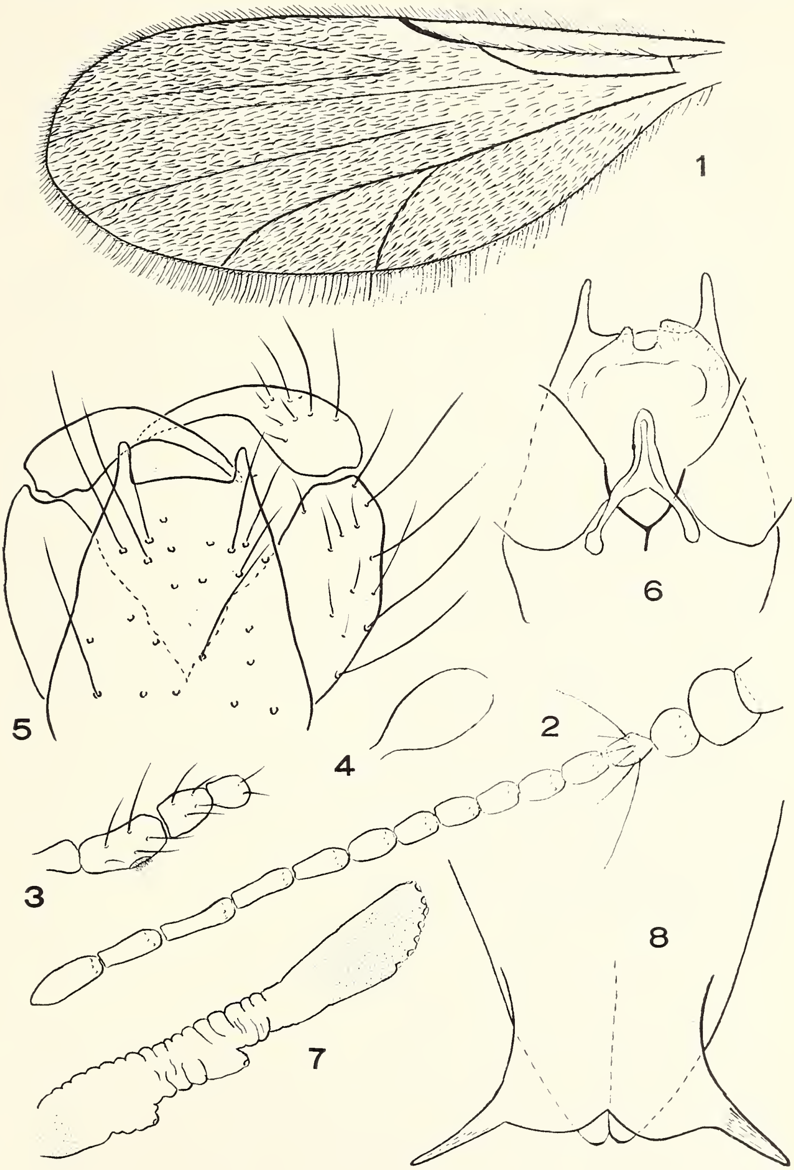
(Plate I)

Male, female. Wing 0.98 mm. long, measured from basal arculus. Thorax dull brownish black. Mesonotal integument with dense, dull, bluish green pruinosity, with vestiture of numerous semi-erect, short, yellowish hairs and a few erect, long, blackish hairs. Scutellum pruinose brownish with about eight long black hairs on margin. Postscutellum and pleuron brownish black. Abdomen blackish. Head, antenna, palpus and legs brownish. Halter yellowish brown. Wing with vestiture of dark greyish hairs, a small costal spot over end of radius whitish.

Explanation of Plate I

Paradasyhelea albipunctata, n. sp. Fig. 1. Wing (female). Fig. 2. Antenna (female). Fig. 3. Palpus (female). Fig. 4. Spermatheca. Fig. 5. Male genitalia (dorsal). Fig. 6. Male genitalia (ventral). Fig. 7. Pupal respiratory horn. Fig. 8. Terminal segment of pupa.

WIRTH AND LEE PLATE I



Female. Antenna with flagellar segments in proportion of 15-10-10-10-11-11-11-11-13-16-20-18-20, a definite break in the flagellar series between antennal segments ten and eleven, segment fourteen shorter than the ones on each side; verticils on distal segments about four times as long as diameter of the segments. Tarsal ratio 1.8. Spermatheca small, elongate, pyriform, measuring 0.026 by 0.013 mm., the length including a long, slender, sclerotized neck.

Male. Genitalia as figured. Apicolateral processes of ninth tergum long and slender and widely separated. Parameres with slender median point projecting cephalad.

Pupal respiratory horn blackish on distal third, with one spiracular opening in middle of annulated portion, one on proximal third of darkened portion and a marginal row of seven around apex.

Types. *holotype* male, *allotype* female, Oxford Falls, near Narrabeen, N.S.W., 10 Nov. 1956 (W. W. Wirth) reared from sandy margin of creek. *Paratypes:* New South Wales: 25 males, 15 females (slides), 9 males, 18 females (pinned), same data except dates 1, 10 Nov. and 6 Dec. 1956; 6 males, 4 females (slides), 1 male, 1 female (pinned), Middle Creek, Narrabeen, 4 Nov. 1956, W. W. Wirth, reared sandy creek margin; 7 males, 7 females (slides), 9 males, 7 females (pinned), McCarr's Creek, 11 Nov. 1956 (W. W. Wirth) reared, muddy creek margin; 1 male, 3 females (slides), Colo Vale, 16, 17 Jan. 1957 (W. W. Wirth) reared sandy margin Nattai River; 35 males, 17 females (slides), 13 males, 5 females (pinned), Kiandra, 19 Dec. 1956 (W. W. Wirth) reared mucky creek margin.

Holotype, allotype and paratype series in School of Public Health and Tropical Medicine, University of Sydney. Paratype series in United States National Museum; British Museum (Nat. Hist.); C.S.I.R.O. Division of Entomology, Canberra, A.C.T.; Queensland Institute of Medical Research, Brisbane, Queensland; B. P. Bishop Museum, Honolulu.

Paradasyhelea minuta Wirth and Lee, n. sp.
(Plate II)

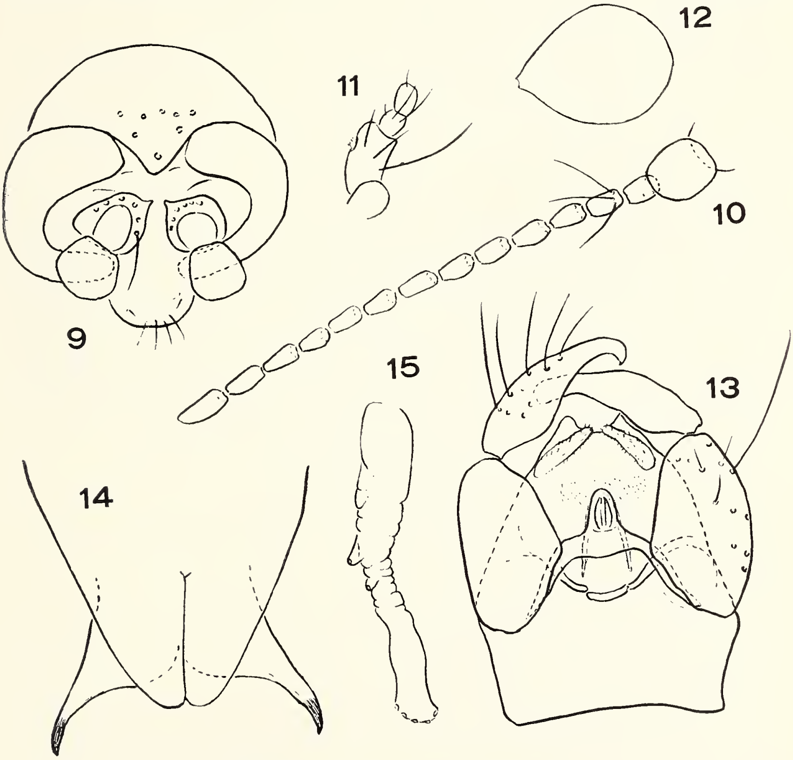
Male, female. Wing 0.75 mm. long measured from basal arculus. Thorax shining dark brown, mesonotum with sparse, suberect, long, brownish hairs; scutellum concolorous with mesonotum, with a few long hairs; head, antenna, palpus, legs and abdomen brownish; haltere pale brownish; wing with unicolorous vestiture of dark greyish hairs.

Female antenna with flagellar segments in proportion of 10-10-

10-10-10-10-10-10-10-10-10-10-16, no break in relative lengths between antennal segments ten and eleven, verticils on distal segments about twice as long as diameter of segment; spermatheca large and slightly ovoid, measuring 0.026 by 0.021 mm., without sclerotized neck.

Male genitalia as figured, apicolateral processes of ninth tergum short, blunt and closely approximated, median sclerite of parameres on arculate transverse bar.

WIRTH AND LEE PLATE II



EXPLANATION OF PLATE II

Paradasyhelea minuta, n. sp. Fig. 9. Head (female). Fig. 10. Antenna (female). Fig. 11. Palpus (female). Fig. 12. Spermatheca. Fig. 13. Male genitalia. Fig. 14. Terminal segment of pupa. Fig. 15. Pupal respiratory horn.

Pupal respiratory horn yellowish to apex, with two widely separated spiracular openings, each situated on a prominence on dorsal margin basal to annulate portion, and a marginal row of about six around apex.

Types. *holotype* male, *allotype* female, Hornsby, N.S.W., 31 Oct. 1956, D. J. Lee, light trap. *Paratypes:* New South Wales: 22 males, 5 females (slides), 8 males, 5 females (pinned), same data as type except dates, 10 Apr., 18 Sept., 25, 26, 31 Oct. 1956, 8 Jan. 1957; 2 males, 2 females (slides), 25 females (pinned), Careel Bay, 20, 27 Sept., 25 Oct., 3 Nov. 1956 (W. W. Wirth) light trap; 1 male, 1 female (slides) Colo Vale, 17 Oct. 1956 (A. Dyce) reared, loamy creek margin; 1 male (slide), Colo Vale, 16 Oct. 1956 (Lee, Dyce, and Wirth) reared from bog; 1 male (slide), Colo Vale, 19 Jan. 1957 (W. W. Wirth) swept from swamp; 1 male (slide), Galston Gorge, 6 Sept. 1956 (Wirth & Lee) reared from wet moss on rocks; 1 male, 3 females (slides), Merricumbene, 30 Nov., 1 Dec. 1954 (A. Dyce) light trap; 10 males, 6 females (slides), 9 males, 7 females (pinned), Middle Creek, Narrabeen, 8, 9, 12, 30 Sept. 1956 (W. W. Wirth) reared sandy creek margin; 1 female (slide), Mosman, 24 Jan. 1957 (W. W. Wirth) light trap; 2 males, 5 females (slides), 2 males, 5 females (pinned), Narrabeen, 6 Sept., 26 Oct., 9, 10 Nov., 13 Dec. 1956 (W. W. Wirth) light trap; 1 male (slide), 1 female (pinned), National Park, 16 Aug. 1953, 14 Sept. 1952 (E. J. Reye) 3 males, 1 female (slides), South Creek, Deewhy, 15 Sept. 1956 (W. W. Wirth). Queensland: 2 females (slides), Gingin, 23 Aug. 1956 (E. J. Reye) on window; 1 female (slide), Noosa, 21 Aug. 1956 (E. J. Reye) at window.

Distribution of types as for *P. albipunctata.*

Comparative Notes

The known species of *Paradasyhelea* may be distinguished as follows:

1. *Paradasyhelea albipunctata,* n. sp. Wing with a small white spot on anterior margin over end of costa; mesonotum dark brown with dull bluish green pruinosity, scutellum paler; tarsal ratio 1.8; female antenna with segments eleven to fifteen each longer than those in preceding series; spermatheca small and elongate with sclerotized neck, male genitalia with long, slender apicolateral processes, median sclerite of parameres Y-shaped; pupa with apex of respiratory horn blackish.

2. *Paradasyhelea minuta,* n. sp. Wing unmarked; mesonotum and scutellum shining dark brown; tarsal ratio 1.7–2.0; female antennal segments in continuous series from three to fourteen;

spermatheca large and only slightly ovoid, without sclerotized neck; male genitalia with short, approximated apicolateral processes, median sclerite of parameres a transverse, arcuate, sclerotized bar; pupa with respiratory horn entirely yellowish.

3. *Paradasyhelea brevipalpis* (Ingram & Macfie). Wing unmarked; mesonotum dark brown; tarsal ratio 1.3; male genitalia with apicolateral processes long and slender; median sclerite of parameres more or less U-shaped (known from male only).

4. *Paradasyhelea egregria* (Macfie). Wing unmarked; mesonotum very dark brown; tarsal ratio 1.7; male genitalia with short, very closely approximated, apicolateral processes, median sclerite of parameres an irregular thickening (known from male only).

THE CLAUSA GROUP OF *COPHURA* OSTEN SAKEN (DIPTERA: ASILIDAE)

By J. Wilcox, Whittier, Calif.[1]

In the revision of the genus *Cophura* Osten Sacken, Pritchard (1943) included *clausa* (Coquillett) in the Fur Group. He noted that it "diverges from the typical Fur by having the anal cell closed . . . ., abdomen well rounded above, and male genitalia smaller, mostly concealed from above, with the median plate and lateral forceps poorly developed." A Clausa Group is proposed for *clausa* (Coquillett) (1893), *hennei* Wilcox and Martin (1945), and two species described here as new. Carrera (1955) described *picta* from Ecuador, which apparently belongs in the Clausa Group. Types will be deposited in the California Academy of Sciences.

Clausa Group

Face at the antennae from 3/5 to 5/6 the width of one eye, with oral bristles and rather long hair reaching almost to the antennae. Posterior and usually anterior dorsocentral bristles well developed. Scutellum wholly pollinose and with well developed marginal bristles. Posterior coxae with an elongate tubercle anteriorly, usually colorless. Wings hyaline or lightly infuscated, third vein branched beyond the apex of the discal cell, anal cell closed and short petiolate. Abdomen of the females largely pollinose, of the males with varied pollinose patterns.

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[1] Entomology Research Division, Agr. Res. Serv., U. S. D. A.

The closed anal cell separates the Clausa Group from all but the Sodalis, Sculleni and Bella Groups. In these groups the wings are brown on the basal two-thirds or more and the abdomen is usually largely reddish or yellowish. The tubercle on the hind coxae is absent in the Sodalis and Sculleni Groups.

The Clausa Group is taken only in the fall and winter, from September to February. *Clausa* (Coquillett) is a coastal species. Pritchard (1943) reported it from San Pedro (September) and Balboa (October) both being coastal towns in southern California. Recently large series were collected at Long Beach (October and November) a half mile from the ocean near the channel of the San Gabriel River. *Hennei* Wilcox and Martin is known only from San Nicolas Island (November and December) off the coast of southern California. *Tolandi* and *getzendaneri* new species are desert species. *Tolandi* occurs from the Mojave Desert of California to the Tucson area of Arizona and was collected mainly on the tips of the leaves of desert tea. *Getzendaneri* occurs from the Colorado Desert of California, to the Yuma area of Arizona, and to the Gulf of California in Baja California. It was collected mainly on the sand. *Clausa* was taken on the sand in cooler weather and from the tips of dried weeds from 3 to 15 inches high in warmer weather.

KEY TO THE GROUPS

1. Anal cell of the wings closed and usually short petiolate 2
   Anal cell of the wings broadly open 5
2. Hind coxae with a conspicuous tubercle on its anterior side; abdomen and wings largely brown, or abdomen black and wings largely hyaline 3
   Hind coxae without tubercle; abdomen largely yellowish or black with yellowish margins; basal 2/3 of the wings brown, the apical 1/3 hyaline 4
3. Wings hyaline or essentially so; abdomen black, the females largely pollinose and the males with varied pollinose patterns; scutellum wholly pollinose .... Clausa Group
   Wings largely brown; abdomen largely reddish brown, the sides narrowly pollinose in both sexes; posterior half of scutellum bare of pollen except at middle .... Bella Group

4. Scutellum wholly pollinose, with or without short marginal bristles; posterior dorsocentral bristles well developed.
Sodalis Group
Posterior margin of scutellum bare of pollen, with long marginal hairs; dorsocentral bristles absent . . . Sculleni Group
5. Scutellum wholly pollinose 6
Posterior margin of scutellum bare of pollen 7
6. Mystax composed of strong sparse bristles reaching to the antennae; third vein branched before discal crossvein and with a stump vein . . . . Trunca Group[2]
Bristles of mystax confined to oral margin, fine short hairs above usually do not reach antennae; third vein branched beyond discal crossvein and without stump vein.
Fur Group
7. Mystax composed largely of fine hairs as long as the first two antennal segments and extending to antennae, oral bristles present or not; usually only the posterior corners of the abdominal segments pollinose . . . . Albosetosa Group
Mystax composed mainly of oral bristles, the hairs above short and inconspicuous; anterior margins and posterior corners of most abdominal segments pollinose 8
8. Third antennal segment spatulate, the style minute, shorter than the second segment; the narrow posterior margin of the scutellum bare of pollen; abdomen smooth.
Painteri Group
Third antennal segment coarctate, style tapering apically and as long or longer than the second segment; broad posterior margin of scutellum bare of pollen; abdomen punctate.
Brevicornis Group

Cophura getzendaneri, n. sp.

Male: Length 7 mm. Head black, densely gray pollinose with a slight golden tinge. Hairs and bristles white, mystax long and dense reaching almost to the antennae, face at antennae ⅔ width of one eye. Ocellar tubercle with a pair of erect bristles and about 12 long erect hairs. Antennae black; first two segments thinly gray pollinose and short white haired, subequal in length and each with

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[2] Applies only to the Nearctic species. Pritchard (1943) described two species from South America, which he included in the Trunca Group.

a pale bristle below; third segment 1½ times length of first two, slightly narrowed on basal third and apically; style ⅓ length of third segment, apical spine white.

Mesonotum densely gray pollinose with a golden tinge; hairs white, sparse and rather long anteriorly and laterally. Bristles white, 2 presutural, 1 postalar, 1 supraalar and 7 dorsocentral. Pleurae and coxae densely grayish golden pollinose and white haired. Scutellum densely gray pollinose, sparse hairs white, white cruciate pair of bristles about twice length of scutellum.

Abdomen spatulate, constricted between the second and third segments. Hairs short white, rather long on sides of segments, 5–6 white lateral bristles on first segment. Black, gray pollinose except as follows: broad dorsum of segment 1; central posterior margin of segments 2–6; segments 4–6 with small anterior lateral spots and 4 with a small central spot; basal ⅓ of segment 3 indented at middle; and basal ¼ of segment 4 indented and bisected by a narrow transverse pollinose line. Segments 7–8 wholly pollinose; small genitalia brown, short white haired. Venter gray pollinose, segments 3–7 with a bare central spot posteriorly, sparse hairs white.

Legs black, basal ¾ of tibiae yellow, knees and base of tarsal joints narrowly yellowish. Hairs and bristles white, hairs rather dense and long on femora. Claws black, narrowly reddish at base; pulvilli and empodia white

Halteres yellowish, lower stem brown; alulae yellowish, margin and fringe white. Wings hyaline, indistinctly yellowish in the basal cells; veins brown (subcosta yellowish), anterior crossvein at 5/6 length of discal cell.

Female: Length 8 mm. Similar. Mystax less dense, the weak oral bristles differentiated from the shorter hairs above. Mesonotum with the central bisected stripe and intermediate areas golden. Abdomen gray pollinose except: broad central portion of segment 1, central posterior margins of segments 2–7, a central and lateral anterior spots on 2–3, lateral anterior spots on 4–5, the narrow dorsum of 7 and all of 8 bare of pollen, apical spines brown. Wings without the yellow in the basal cells but the veins basally yellowish.

Types: Holotype male, Indio, Cal., XI–17 '47 (J. Wilcox). *Allotype* female, same data (A. F. Howland). *Paratypes:* 200 from type locality, XI–11 '41 and '47, XI–17 '47, XI–18 '41, I–6 '48, I–8 '42 and II–12 '52 (Howland and Wilcox); White Water, XI–10 to 28 '47, XII–23 '47, I–6 and 13 '48 (Howland and Wilcox); Mecca, I–14 '33 (C. W. Getzendaner) and XI–11 '47 (Wilcox); 5 miles south of Oasis, XI–10 and 18 '47 and '55 (Itol J. Wilcox, Howland and Wilcox); Palm Springs, XII–28 '52, XII–29 '53 to I–12 '54 (P. H. Arnaud and Wilcox), R. R. Station XI–18 '41 (Wilcox), all Riverside Co., Calif. Yuma, Ariz., II–14 '55 (Howland and Wilcox). San Felipe, Baja Calif., Mex., II–19 and 20 '54 (Arnaud).

Named for Charles W. Getzendaner who first collected this species. The twisted spine at the apex of the fore tibiae is colorless and not easily found in many specimens.

Cophura tolandi, n. sp.

Male: Length 6 mm. Head black, densely gray pollinose, hairs and bristles white. Mystax composed of 3 rows of oral bristles and above with fine proclinate hairs reaching almost to antennae, face at antennae ⅔ width of one eye. Ocellar tubercle with a pair of erect weak bristles and sparse hairs. Antennae black; first two segments subequal in length, sparse white haired and each with a weak white bristle below; third almost twice length of first two and slightly tapering apically; style including colorless apical spine ⅓ length of third segment.

Mesonotum black, densely gray pollinose, central bisected stripe and intermediate areas before and behind suture, brown. Sparse erect hairs white; bristles white, 2 presutural, 1 supraalar, 1 postalar, and 2 posterior dorsocentral. Pleurae and coxae densely gray pollinose, hairs white. Scutellum densely gray pollinose with one pair of marginal bristles about as long as scutellum, disc with a few short inconspicuous hairs.

Abdomen shining black; hairs white, inconspicuous on dorsum, laterally a little longer; first segment with 3 white lateral bristles. Sides of all segments, anterior margin of segments 2–7 and oblique bands extending from the posterior corners to anterior margin near middle of these segments, gray pollinose; on segments 2–3 the bands do not reach the anterior margin but on 4–6 they do and enclose lateral bare spots anteriorly; short segment 7 pollinose anteriorly; small genitalia brown with white hairs. Venter black, gray pollinose and white haired, posterior marigns of segments yellowish.

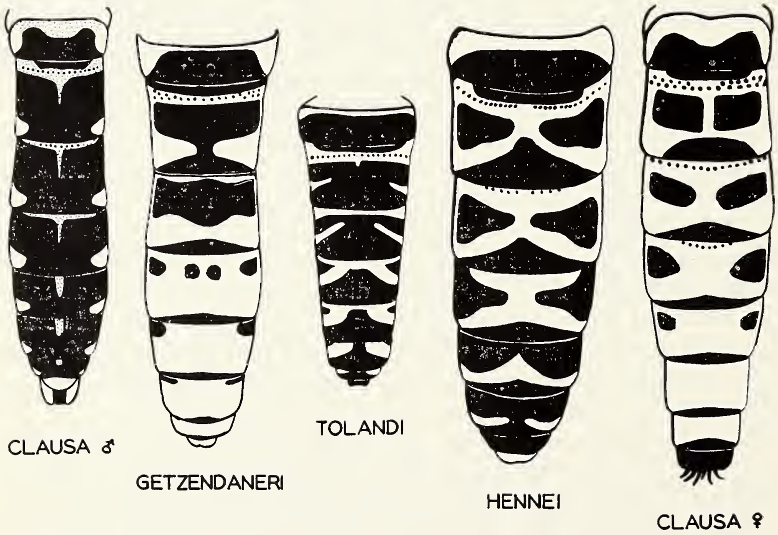
Legs black, tips of femora and dorsum of tibiae, brown. Hairs and bristles white, appressed hairs on femora silky and quite numerous. Claws black, reddish at base; pulvilli and empodia white.

Halteres yellowish white, lower stem brown. Alulae yellowish white, fringe white. Wings clear hyaline, veins brown, anterior crossvein at 7/9 length of discal cell.

Female: Length 7 mm. Similar. Pollen of face with a slight and pleurae with a definite golden tinge. Abdomen largely pollinose; dorsum of first segment, anterior margin of second, and posterior margin of segments 2–7 broadly V-shaped plus an indentation at middle, bare of pollen; on segments 6–7 the indentation reaching anterior margin; segments 2–4 with a suggestion of lateral bare spots; segment 8 bare of pollen; apical spines brown.

Types: Holotype: Male, White Water, Riverside Co., Cal., XI–28 '47 (J. Wilcox). *Allotype:* Female, same data, XII–27 '47. *Paratypes:* 170, type locality, Nov. to Jan. '47 and '48 (A. F. Howland, C. H. Martin, Wilcox); Palm Springs, Cal., XII–29 '53 to I–8 '54 and Tahquitz Canyon, XII–25 '52 and I–7 '53 (P. H. Arnaud); East Highlands, San Bernardino Co., Cal., XI–17 '56 (Wilcox); Littlerock, Los Angeles Co., Cal., XI–23 '41 (Guy F. Toland). Organ Pape Cactus National Monument, Ariz., X–25 '56 (Wilcox); Pinal Co., Ariz., 1700', I–14 '28 (A. A. Nichol); Wenden, Ariz., XI–15 '55 (Wilcox).

Named for Guy F. Toland who first brought this little humpbacked species to my attention.



Figures of abdominal pollinose patterns of the Clausa Group: male abdomen of the four species plus the female abdomen of *clausa*. White areas indicate the pollinose areas.

KEY TO THE SPECIES

1. Wings infuscated or clouded on the crossveins and furcations; the basal ⅓ of the first abdominal segment pollinose 2

   Wings hyaline, yellowish in the basal cells of some of the males; only the sides of the first abdominal segment pollinose 3

2. Male abdomen with narrow anterior pollinose fasciae and the posterior fasciae broadly interrupted; scutellum wholly pollinose, the marginal bristles cruciate; length 6–8 mm. (Cal.) . . . . *clausa* (Coquillett)

   Male abdomen with broad anterior and posterior pollinose fasciae, entire or nearly so on most segments; scutellum with a narrow bare spot on the disc at the middle, marginal bristles tend to separate rather than cross; length 8–9 mm. (Cal.) . . . . *hennei* Wilcox and Martin

3. Scutellum with discal hairs, marginal bristles twice the length of the scutellum; basal half to ¾ of the tibiae yellowish; 2–4 strong anterior dorsocentral bristles; male wings usually yellowish basally; length 6–9 mm. (Cal., Ariz.) *getzendaneri* new species

   Scutellum without hairs on disc, marginal bristles subequal in length to the scutellum; dorsum of the tibiae reddish; without strong anterior dorsocentral bristles; wings in both sexes hyaline; length 4–7 mm. (Cal., Ariz.) *tolandi* new species

LITERATURE CITED

Carrera, M. 1955. Novos Generos E Novas Especies De Dasypogoninae Neotropicais (Diptera, Asilidae). Papeis Avulsos 12 (2): 106–109.

Coquillett, D. W. 1893. Synopsis of the asilid genus *Blacodes*. Can. Ent. 25: 33–34.

Pritchard, A. E. 1943. Revision of the genus *Cophura* Osten Sacken (Diptera: Asilidae). Ann. Ent. Soc. Amer. 36 (2): 281–309.

Wilcox, J. and **C. H. Martin.** 1945. Contributions from the Los Angeles Museum Channel Islands biological survey. 29. Robber Flies (Diptera, Asilidae). Bul. S. Cal. Acad. Sci. 44 (1): 10–17.

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BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

Vol. LIV DECEMBER, 1959 No. 5

UNDESCRIBED SPECIES OF NEMATOCEROUS DIPTERA. PART VIII.[1]

By Charles P. Alexander, Amherst, Mass.

The preceding part under this general title appeared in June 1959 (Bul. Brooklyn Ent. Soc. 54: 53–59). At this time I am discussing various species of the so-called winter crane-flies from the Himalayas, where they were collected by Dr. Fernand Schmid in Uttar Pradesh, North India. I am greatly indebted to Dr. Schmid for large series of crane-flies from many parts of India, including the Himalayas. The types of the novelties here described are preserved in my personal collection.

TRICHOCERIDAE

Paracladura kumaonensis, n. sp.

Size relatively large (wing of male 4.8 mm. or more); general coloration of thorax dark brown; antennae with basal two segments yellow, basal flagellar segments darkened, the outer ones paling to yellow; halteres brownish black, the base of stem narrowly yellow; wings relatively broad, very weakly infuscated, unpatterned; *Sc* relatively long, Sc_1 ending opposite R_2, cell *2nd A* narrow; abdomen dark brown; male hypopygium with the gonapophyses appearing as narrow blades, near outer end bent at a right angle into a long nearly straight spine.

Male: Length about 3.5–3.6 mm.; wing 4.8–5 mm.; antenna about 2.8–3 mm.

Female: Length about 4 mm.; wing 6 mm.

Rostrum yellow; palpi dark brown. Antennae with the sunken

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[1] Contribution from the Entomological Laboratory, University of Massachusetts.

scape and enlarged pedicel yellow; basal four or five flagellar segments brown, the outer ones paling to yellow; proximal five or six segments of moderate length, the outer ones greatly lengthened. Head buffy, darker on posterior vertex; ocelli very distinct.

Thorax dark brown, posterior sclerites and pleura somewhat paler. Halteres brownish black, base of stem restrictedly yellow. Legs with coxae and trochanters light brown; remainder of legs dark brown, passing into brownish black; vestiture of legs long and delicate. Wings relatively broad, very weakly infuscated, unpatterned; veins pale brown, with long conspicuous trichia. Venation: Sc relatively long, Sc_1 ending opposite R_2, Sc_2 about opposite two-fifths the length of the long straight Rs; R_{2+3+4} variable, from subequal to R_{2+3} to nearly twice this length; *m-cu* more than one-half its length beyond the fork of M_{3+4}; cell *2nd A* narrow, especially basally, gradually widened outwardly to before the tip.

Abdomen, including hypopygium, dark brown, with long pale setae; styli somewhat paler. Cerci of female appearing as whitened compressed blades, narrowed to the subacute tips. Male hypopygium with the dististyles relatively short and stout, unarmed, apex obtuse; outer surface with numerous long pale setae, mesal face with very abundant short erect pale setulae. Phallosome including a central structure that terminates in two narrow pale blades; each gonapophysis appearing as a narrow blade, near its outer end bent at a right angle into a long nearly straight spine.

Habitat: North India (Kumaon, Uttar Pradesh).

Holotype: ♂, Manghu Chatti, Pauri Garhwal, 9270 feet, May 21, 1958 (Fernand Schmid). *Allotype:* ♀, Trijugi, Pauri Garhwal, 7000 feet, May 26, 1958. *Paratypes:* ♂, Gaurikund, Pauri Garhwal, 6400–7200 feet, May 10, 1958; 1 ♂, pinned with the allotype; 2 ♂♂, Gangrea, Pauri Garhwal, 7500–10,000 feet, June 12, 1958.

Paracladura kumaonensis is quite distinct from other regional species, including *P. elegans* Brunetti and *P. gracilis* Brunetti, in the coloration of the body and legs. It is more like *P. omeiensis* Alexander, of western China, distinguished by the larger size and by the venation, including the long *Sc*.

Trichocera bisignata, n. sp.

Size medium (wing of female 6.5 mm. or more); general coloration of thorax dark brown, more or less variegated by paler posteriorly; knobs of halteres brownish black; legs brownish black to black; wings broad, weakly tinted, with two conspicuous brown areas, one beneath the origin of *Rs,* the other over the anterior cord; vein *2nd A* with two macrotrichia beyond midlength; abdomen uniformly dark brown; ovipositor with cerci relatively long and only gently curved.

Female: Length about 5.8–6 mm.; wing 6.5–7 mm.; antenna about 2.4–2.5 mm.

Rostrum and palpi black. Antennae relatively short; scape and pedicel dark brown, flagellum black, the outer segments paler. Head dark brown.

Pronotum brownish black, scutellum and pretergites paler. Mesonotal praescutum dark brown, with four slightly indicated darker stripes on disk, margins weakly darkened; remainder of mesonotum dark brown, vaguely patterned with paler at suture, on posterior-lateral parts of scutal lobes and posterior border of scutellum; parascutella and pleurotergite pale, especially in holotype. Halteres relatively short, stem brownish yellow, knob brownish black. Legs with coxae brown, trochanters slightly paler; femora dark brown, bases slightly brightened; remainder of legs uniformly brownish black to black. Wings broad, weakly tinted; two large and conspicuous brown areas on disk, one over *r-m* and adjoining veins, the other beneath the origin of *Rs,* chiefly in cell *R* but including also cell R_1; much narrower brown seams over outer end of cell *1st* M_2 and *m-cu;* veins light brown, darker in the clouded areas. Vein *Sc* with numerous dorsal and ventral punctures without trichia both basad and distad of *h,* followed by a short glabrous area; outwardly setiferous punctures very numerous, especially beyond origin of *Rs;* no trichia on *r-m;* vein *2nd A* with two separated trichia beyond midlength. Venation: Sc_1 ending opposite R_2; R_{2+3+4} and R_{2+3} subequal; cell M_1 parallel-sided, about one-half longer than its petiole; *m-cu* shortly before or beyond fork of M_{3+4}; cell *2nd A* widened outwardly, the vein bent strongly into the margin.

Abdomen uniformly dark brown; ovipositor with cerci horn-yellow, relatively long, only gently curved.

Habitat: North India (Kumaon, Uttar Pradesh).

Holotype: ♀, Rata, Almora, 11,000 feet, September 14, 1958 (Fernand Schmid). *Paratopotype:* ♀, on same pin, beneath the type.

Trichocera bisignata is readily told from other regional members of the genus by the wing pattern. It suggests species such as *T. maculipennis* Meigen or *T. fernaldi* Alexander, differing from these in the coloration of the body, legs and wings, the vein trichiation, and the venation, especially of the radial field.

Particular attention is called to an important paper by Laurence, discussing the trichiation of the wing veins in several European species of *Trichocera*.[2] Although some earlier workers had made use of the character of number and arrangement of the trichia on the veins in this genus, the detailed statistical study by Laurence has added materially to our knowledge of the subject. Of particular value is his distinguishing between the trichia of the upper (dorsal) and lower (ventral) surfaces of the various veins. He considers especially the arrangement of the trichia on veins *Sc* and *Rs* but it is evident that certain other veins are of comparable importance, particularly *2nd A*.

From Laurence's detailed study of *Trichocera saltator* (Moses Harris), it now seems evident that some confusion in the synonymy and geographical distribution has resulted in the past. It would appear that this species does not occur in North America, as hitherto reported, and the species so named presumably will have to be designated by one of its later names, hitherto placed in the synonymy.[3] It likewise seems certain that *Trichocera montana* Brunetti, described from the western Himalayas, is a species distinct from *T. saltator,* as now defined. This fly is not known to me, not having been re-discovered by Schmid or other recent collectors in the western Himalayas. It is described as being unusually small, scarcely larger than *Paracladura gracilis* Brunetti, and thus indicating a species very much smaller than any other of the now numerous members of the genus known from the Himalayas.

Trichocera schmidi, n. sp.

Size large (wing of male 9 mm.) ; general coloration of thorax brown, the pleura brownish yellow; knobs of halteres infuscated; legs light brown; wings weakly tinged with brown, with vague darker clouds beneath origin of *Rs* and over *r-m;* veins with numerous macrotrichia, including complete series on *Sc;* male hypopygium very large and complex, with hair brushes and pencils on both the basistyle and dististyle.

Male: Length about 9 mm.; wing 9 mm.; antenna about 4.2 mm.

Rostrum and the elongate palpi black. Antenna moderately

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[2] Laurence, B. R. The British species of Trichocera (Diptera: Trichoceridae). Proc. R. ent. Soc. Lond. (A) 32: 132–138, 2 figs.; October 1957.

[3] Alexander, C. P. Diptera of Connecticut, 1: 191; 1942.

long; scape brown, pedicel light yellow, flagellum dark brown; outer flagellar segments very slender. Head brown.

Pronotum brown, vaguely patterned with darker, scutellum light yellow laterally; scutum with erect black setae. Mesonotal praescutum with the median area yellowish brown, the sides slightly darker; posterior sclerites of notum obscure yellow; vestiture of notum relatively long but sparse, black; scutellum with four long, slightly incurved setae. Pleura brownish yellow. Halteres with stem yellowed, knob infuscated. Legs with coxae and trochanters testaceous yellow; remainder of legs light brown, terminal tarsal segments blackened. Wings weakly tinged with brown; vague darker clouds beneath origin of *Rs* and over *r-m;* veins brown, delicate. Macrotrichia present on all longitudinal veins except near wing base, lacking at origin of *Rs* and basal fourth of *M* and *1st A; r-m* and *2nd A* without trichia; *Sc* with numerous trichia over the whole length. Venation: Sc_1 ending nearly opposite R_2, Sc_2 shortly beyond origin of *Rs;* R_{2+3+4} subequal to R_{2+3}; cell M_1 slightly longer than its petiole; vein *2nd A* relatively long, curved very gradually to the margin.

Abdomen, including hypopygium, yellowish brown. Male hypopygium very large and complicated in structure. Basistyle with a strong compact pencil of bristles on mesal face at near midlength, arising from a short basal tubercle; near apex of style on mesal face with two elongate closely approximated setae. Dististyle nearly as long as the basistyle, strongly curved, narrowed outwardly into a slender straight rod; vestiture includes a compact oval area of long yellow setae on basal third, these varying in length, some very long; a narrower group of very long setae at near two-thirds the length, ending at the base of the narrowed tip, the latter with scattered bristles, terminating in a few stronger setae. A central depressed-flattened plate that terminates in four points, the lateral pair slender, with obtuse tips, the inner pair shorter, broad, more or less folded. Each gonapophysis appears as a small slender blade, the two decussate at the midline.

Habitat: North India (Kumaon, Uttar Pradesh).

Holotype: ♂, Rata, Almora, 11,000 feet, September 14, 1958 (Fernand Schmid).

This distinct fly is named for the collector, Dr. Fernand Schmid, who has added vastly to our knowledge of the insect fauna of the Himalayas. *Trichocera schmidi* is readily told from all other regional species of the genus, where the male sex is known, by the striking modifications of the male hypopygium, particularly of the basistyle and dististyle. In these features the fly is quite distinct from all others that have complex male hypopygia, such including *T. colei* Alexander, *T. forcipula* Nielsen, *T. lutea* Becher, *T. mirabilis* Alexander, *T. salmani* Alexander, *T. ursa-major* Alexander, and a few others not so highly modified.

Trichocera tenuicercus, n. sp.

Size large (wing of female over 8 mm.); general coloration of mesonotal praescutum and scutal lobes dark brown, the posterior mesonotum brownish yellow; anterior thoracic pleura dark brown, the posterior sclerites paler; wings broad, weakly tinged with brown, unpatterned except for the slightly darker stigma; abundant macrotrichia on all longitudinal veins except *2nd A*; Sc_2 about opposite two-fifths *Rs*; cell M_1 relatively deep, about three times its petiole; abdominal tergites uniformly dark brown; ovipositor with cerci unusually long and narrow, the lower margin very gently arcuated.

Female: Length about 8 mm.; wing 8.2 mm.

Rostrum dark brown; palpi brown, terminal segment about one-third longer than the constricted penultimate. Antennae dark brown; first flagellar segment enlarged at base, strongly narrowed outwardly. Head dark brown.

Pronotal scutum dark brown, scutellum yellowed. Mesonotal praescutum and scutal lobes almost uniformly dark brown, with sparse elongate black setae; posterior sclerites of notum brownish yellow; scutellum with three erect setae on either side of midline. Propleura and mesepisternum dark brown, the mesepimeron and metapleura much paler; dorsopleural membrane light brown. Halteres with stem yellow, knob broken. Legs with fore coxae dark brown anteriorly, the remainder of coxae and the trochanters brownish yellow; mid and hind coxae with a row of long setae, not as well indicated on fore pair; remainder of legs dark brown. Wings broad, weakly tinged with brown; stigma slightly darker brown, extending from R_2 to tip of vein R_{1+2}; veins slender, dark brown. Macrotrichia of veins very abundant, of moderate length, on all longitudinal veins excepting *2nd A*; *Sc* with trichia throughout its length. Venation: Sc_1 ending shortly before R_2, Sc_2 about opposite two-fifths *Rs*; R_{2+3+4} and R_{2+3} subequal, about one-half R_{1+2}; cell M_1 relatively deep, about three times its petiole; *m-cu* close to fork of M_{1+2}; vein *2nd A* relatively long, slightly angulated beyond midlength, the cell much narrower than in *alticola*.

Abdomen dark brown, proximal sternites vaguely yellowed at base. Ovipositor with cerci unusually long and narrow, with scattered setigerous punctures provided with pale setae; lower margin very gently arcuate.

Habitat: North India (Kumaon, Uttar Pradesh).

Holotype: ♀, Manghu Chatti, Pauri Garhwal, 9000–9270 feet, May 20, 1958 (Fernand Schmid).

The most similar regional species is *Trichocera alticola* Alexander, occurring at high altitudes in Kashmir. This differs in the coloration of the body and wings, the trichiation of the veins and especially in the longer and more slender cerci. In *alticola* vein *2nd A* has about a dozen macrotrichia on more than the basal half. The European *T. major* Edwards is smaller, with the venation and vein trichiation distinct, including a series of trichia on the basal two-thirds of *2nd A*.

FIRST RECORDED OCCURRENCE OF THE GENUS DIOXYS IN IDAHO (HYMENOPTERA: MEGACHILIDAE)

By Arthur R. Gittins[1]

During 1958 the writer observed a single pinned specimen of *Dioxys* carrying an Idaho locality label in a box of miscellaneous Apoidea. Since this genus had not previously been recorded from the state, the specimen was sent to Paul D. Hurd and was identified by him as a female of *Dioxys pomonae pomonae* Cockerell.

The specimen was collected from flowers of Horse Brush, *Tetradymia canescens* D. C., four miles east of Terreton, Jefferson County, Idaho, on July 25, 1957 by W. F. Barr.

This collection was made at the northeastern limits of the Columbia plateau and increases by approximately 200 miles the known northward range of the species. Additionally, it serves to confirm the presence of this genus and species in Idaho, which is within the limits suggested by Dr. Hurd in a recent paper "American Bees of the Genus Dioxys Lepeletier and Serville," Univ. of Cal. Publ. in Ent. 14(4): 282, 1958.

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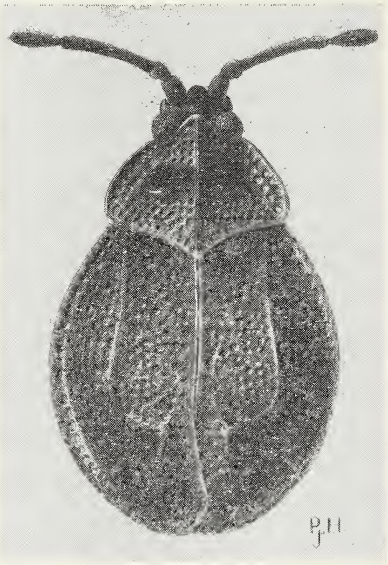
[1] University of Idaho, Moscow, Idaho.

A NEW MOSS-FEEDING TINGID FROM MEXICO (HEMIPTERA)

By Carl J. Drake[1] and Florence A. Ruhoff[1]

The Holarctic genus *Acalypta,* erected for the European *Tingis carinata* Panzer, is represented in the Americas by 10 species, including the taxonomic changes consummated herein. To the present writing, this genus was known to occur only in Canada and the United States in the Western Hemisphere. The description of a new *Acalypta* from Mexico extends the range of the genus into the Neotropical Region. The Old World members of the genus inhabit the Palearctic Region.

Since little attention has been given to moss-inhabiting insects, *Acalypta* is very poorly represented in most museum collections. The Mexican species was found in connection with the cataloguing of the Tingidae of the world (National Science Foundation Grant 04095). We are indebted to Patricia J. Hogue for making the fine drawing of the holotype of the new species.



(Fig. 1)
Acalypta mniophila, n. sp.

Acalypta mniophila, n. sp.

Brachypterous Form: Small, ovate, dark fuscous brown with paranota, costal area of elytra, and bucculae brown, calli and head blackish, antennae blackish fuscous, legs brownish fuscous with femora darker, and body beneath mostly dark fuscous. Length 2.00 mm., width 1.25 mm. (widest part of elytra.)

Head short, with only an indistinct median tubercle, antenniferous tubercles large, concave within; bucculae wide, parallel, with ends not meeting anteriorly, mostly biseriate, triseriate in widest part. Antennae rather stout, segmental measurements: I,

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[1] Smithsonian Institution, Washington, D. C.

0.11; II, 0.85; III, 0.40; IV, 0.22 mm. Labium very long, yellowish brown, extending a little beyond metasternum. Eyes blackish, transverse, nearly twice as deep as long. Metathoracic scent gland with ostiole and ostiolar canal on each metapleuron. Hypocostal lamina long, composed of one row of moderately large areolae. Legs moderately stout, sparsely clothed with short, golden pubescence.

Pronotum depressed, areolate, unicarinate, with hind margin subangulately lengthened backward with apex bluntly rounded; median carina raised, composed of one row of small areolae; calli depressed, impunctate; paranota moderately wide, biseriate, with exterior margins jointly rounded; hood moderately large, extended forward between eyes to middle of vertex. Elytra very broad, convexly raised; costal area rather narrow, projected horizontally, mostly uniseriate, with a few additional, very small cells near apical fourth; subcostal area very wide, sloping sharply obliquely downward, seven areolae deep adjacent to discoidal area; discoidal area flat, on same level as sutural area, about two-thirds as long as elytron, broadly subrounded at apex, six areolae deep in widest part, with inner boundary vein becoming indistinct anteriorly. Macropterous form and male unknown.

Holotype (brachypterous female), Central Mexico, in moss, Aug. 16, 1947, in U. S. National Museum (USNM No. 64870).

Three of the American species of *Acalypta* have unicarinate pronotum. These are *A. duryi, A. saundersi,* and *A. mniophila,* n. sp. The pronotum is tricarinate in all other members of the genus.

A. mniophila is most closely related to *duryi* and differs from it in having narrower, biseriate paranota, smaller areolae in paranota and costal area, and more convex dorsal surface of elytra. *A. duryi* is a distinctly broader species with triseriate paranota. All of the American species of *Acalypta* are muscicolous.

Acalypta barberi Drake

Acalypta barberi Drake, 1934, Bul. Brooklyn Ent. Soc., 29: 196.
Acalypta mera Drake, 1941, J. Washington Acad. Sci. 31: 142 (*New Synonymy*).

A comparison of the holotypes of *Acalypta barberi* Drake (brachypterous female, Merrifield, New York) and of *A. mera* Drake (brachypterous male, British Columbia, Canada) shows that these two names apply to the same species. The former name has priority by several years. This synonymy is also confirmed by numerous specimens (brachypterous and macropterous forms of both sexes) of *mera* from Oregon and by a brachypterous male and female of *barberi* from Fundy National Park, New Brunswick, Canada. *A. barberi* is primarily a moss-inhabiting species. At Cobern, Oregon, July 26, 1935, a series of specimens (both short- and long-winged individuals) were found feeding on the leaves of hops by Dr. L. P. Larson. Although numerous adults were collected on the hops, these plants were simply fortuitous hosts providing sustenance for the wandering tingids in forced migration.

Macropterous form: Dark brownish fuscous, antennae brownish to fuscous-brown with fourth segment black and shiny, legs dusky brown with tips of tarsi and most of femora dark fuscous. Head black with tips of anterior pair of spines brownish. Body beneath black-fuscous with thoracic sternum dark brown or blackish.

Form obovate, widest behind middle of elytra. Pronotum tricarinate, moderately convex across humeral angles, much longer in brachyptery; all carinae uniseriate and equally elevated; lateral carinae feebly divergent posteriorly, terminating anteriorly slightly behind hood, there with the width of the space between them slightly less than that of the base of hood; paranota mostly biseriate, only one areola deep behind, with outer margin feebly convex. Elytra distinctly longer than abdomen; costal area mostly uniseriate, with one or two extra areolae at base and three or four additional cells in subapical part; subcostal area sloping obliquely downward, four areolae deep; discoidal area elongate, more widely angulate behind than in front, seven-thirteenths as long as elytra, five areolae deep a little behind middle.

Specimens of this moss-feeding species are at hand from Oregon (Warren, Scio, Salem, Cobern, Corvallis, McMinnville); New York (Merrifield) and Canada (British Columbia).

AMERICAN SPECIES OF ACALYPTA WESTWOOD

1. *barberi* Drake, 1934 = *mera* Drake, 1941	New York, Oregon; New Brunswick, British Columbia
2. *cooleyi* Drake, 1917	Montana
3. *duryi* Drake, 1930 = ovata Osborn and Drake, 1916	Ohio, Tennessee
4. *lilliana* Torre Bueno, 1916 = *grisea* Heidemann, 1917 = *modesta* Parshley, 1921 = *ovata* Osborn and Drake, 1916	Transcontinental. Newfoundland south to North Carolina, west to Nebraska and British Columbia

5. *mniophila,* n. sp.	Mexico (Central)
6. *nyctalis* Drake, 1928	New Hampshire, Alaska; Newfoundland, Alberta, British Columbia
7. *saundersi* Downes, 1927	Washington; British Columbia
8. *thomsonii* Stål, 1873 = *madelinae* Torre Bueno, 1926	Eastern U. S. (Mass. to Florida)
9. *vanduzeei* Drake, 1928	California
10. *vandykei* Drake, 1928	California, Oregon

ANNOUNCEMENT

An Illustrated Synopsis of the Principal Larval Forms of the Order Coleoptera, by A. C. Boving and F. C. Craighead. First published as volume XI of **Entomologica Americana** in 1931, this great volume is universally accepted as the authoritative work on this subject. The late Charles W. Leng described this book in the following way. "It consists of a preface, in which generous recognition of the work of his colleagues is found; of an introduction, in which the general types of larvae are designated and the scheme of classification thereof is described; of a synopsis (pp. 9–68), in which the salient characters of the larvae of each family and subfamily are given, followed (pp. 81–338) by 125 plates on which about 2500 figures illustrate the characters used in the synopsis. Throughout the phylogeny of the order, summarized on plate 125, and the bearing of the relationships disclosed, are kept before the reader, footnotes being used copiously for that purpose. It thus constitutes, as described in its title, an illustrated synopsis of the larval forms of Coleoptera, and even more, a system of classification based exclusively on larval characters."

This work was reprinted in book form in 1953 and is available for $10.00 (foreign, $10.50). Please direct all orders to Mr. R. R. McElvare, P.O. Box 386, Southern Pines, North Carolina.

RELATION OF EYE COLOR TO MOLTING IN PERIPLANETA AMERICANA L.

By Ruth A. Flint[1] and Robert L. Patton[1], Ithaca, New York

Profound and important physiological changes occur in insects during their molting cycle. These changes are most significant just before, during, and immediately after the molt itself. Since the molting period is a time of greatly increased physiological activity and also one in which the insect is more susceptible to the effects of its environment, it is important that investigators of both normal and abnormal physiology take this factor into account. A reliable method of forecasting the molting period has great importance. This is especially true in toxicological studies where the exclusion of molting individuals is necessary to insure valid data and to limit variation and also in studies of the changes occurring at molt.

The method described is simple and very obvious. The fact that reptiles have dull or smoky eyes before molting has been known to students of that class for a very long time (Wright and Wright, 1957, *Handbook of Snakes,* Comstock Publishing Assoc., p. 26). It is not surprising therefore to find this same phenomenon in insects, which also shed their skin. When the new integument is formed the dissolution and absorption process leaves a space between the two integuments. This produces a change in the eye color probably due to the diffraction of light.

The eyes of *Periplaneta americana* L. are usually a glistening black. As the new integument separates, the eyes become dull and have a smoky appearance. During the next three days the eyes become progressively more blue until a very conspicuous powder blue color with an opaque overcast is reached just before ecdysis.

To check the precision of this method of forecasting, full grown nymphs with swollen wing pads were selected from laboratory colonies. These were scrutinized carefully under a bright light and sorted into three groups—25 with blue eyes, 17 with dull eyes and 30 with glistening black eyes. These were placed in separate containers and observed for a week. During the first four days all the blue-eyed individuals molted; during the next three days (or within seven) all the dull-eyed individuals molted. None of the black-eyed nymphs molted during this time. The reliability of this method with the given samples was 100%.

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[1] Department of Entomology and Limnology, Cornell University.

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